LANDSCAPE STUDY AND MANAGEMENT ALTERNATIVES FOR REVEGETATION

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LANDSCAPE STUDY AND MANAGEMENT ALTERNATIVES FOR REVEGETATION

Whitman Mission National Historic Site

National Park Service Interdisciplinary Study
by the Pacific Northwest Regional Division of
Cultural Resources,
Science and Technology,
Resource Management
and the staff of Whitman Mission National Historic Site

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Summer 1984

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INTRODUCTION

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Authorized in 1936 by an Act of Congress, Whitman Mission National Historic Site memorializes the work and efforts of Dr. Marcus Whitman and Narcissa Prentis Whitman between the years 1836 and 1847 when they established an Indian mission along the Walla Walla River in the Oregon territory. Whitman Mission, and another mission at Lapwai some 110 miles to the east were the first established in the Columbia Plateau. Sent by the American Board of Commissioners to teach Christianity and educate the Indians in the ways of white culture, the Whitmans worked eleven years building their mission.

Located along what later became the Oregon Trail, Whitman Mission also provided goods and services to the increasing number of immigrants making their way west.

In part, it was this increase in the number of settlers arriving at Waiilatpu, in addition to a general mistrust and misunderstanding between cultures, that contributed to the tension between the Cayuse and mission residents, eventually ending in the tragic deaths of the Whitmans and eleven others in 1847.

The physical complex of the mission was for the most part, destroyed within months of the Whitmans' deaths. The following year, members of the Oregon Volunteers occupied the site and used rubble from the destroyed mission structures to build Fort Waters. Several years later (about 1853) another group of traders settled at Waiilatpu and built one (or more) wooden buildings on the mission grounds. In 1855 an Indian war on the Columbia Plateau began and once again, the mission site was abandoned.

In 1860 Cushing Eells (who later founded what became Whitman College) filed a claim for 640 acres which included the mission site. He built a frame house on the site and lived there until 1872 when fire destroyed the house. Two other houses were built on the site. One stood until 1912, the other (and last structure built) was torn down in 1936. That same year the United States Congress authorized the site establishing Whitman Mission National Historic Monument.

Over the years the National Park Service conducted historical archeology at the sites of the mission structures and restored the millpond, fruit orchard, irrigation ditch, a portion of the Oregon Trail, fencing and the old oxbow of the Walla Walla River.

In 1963 the official name was changed to Whitman Mission National Historic Site. Today the site comprises 98.15 acres and contains the grounds of the mission buildings, millpond, the oxbow, pastureland to the south of the mission, Shaft Hill and the Great Grave (1897), Pioneer and Indian cemeteries, an administrative core with maintenance building, residence, visitor center and other service facilities.

PURPOSE OF THE STUDY

Resource management in the park focuses on the combined preservation of cultural and natural resources in an effort to communicate the historic scene during the active years of Whitman Mission (1836-1847).

Stressing the need for interpretation of resources as stated in the current Resource Management Plan, "Preservation and protection of cultural resources at Whitman Mission is of prime importance, but would be of little value if the public cannot benefit from it."

Directly related to the preservation and interpretation of cultural resources is the integrity and context of the natural landscape. Landscapes are inherently dynamic systems that change due to human impacts as well as normal ecological cycles. Whitman Mission National Historic Site is located in a landscape that has been highly modified, both during the Whitmans and after, by grazing domestic livestock, agriculture, and other human-related activities. Natural grassland communities could not compete. Consequently over the years, the site has lost much of its historic plant cover. The grounds are filled with exotic grasses and noxious weeds, conflicting considerably with the historic scene.

The Resource Management Plan (1984) statement explains in more detail:

> Vegetation on the lands within the Park has been altered to the point that, as far as can be determined, virtually no area of the native vegetation remains. The area south of the Mission site is in pasture; Shaft Hill has been cultivated during the past years, as was the northern section; and the Mission site and Visitor Center grounds have been landscaped. Noxious weeds infest most of the ground cover to a degree that requires control measures be taken to be sensitive to the problems that led to their being targeted under the State and County Noxious Weed Control Program, and to prevent the weeds from being an irritant to the visitor and adjacent land owners.

Quality of interpretation, protection of cultural resources, enhancement of native or other desired vegetation, prevention of further vegetation loss, control of noxious weeds and wildlife management all require a clear plan integrating cultural and natural resource management. Determining the best possible ecological condition toward which to strive and developing management strategies and techniques aimed at enhancing the landscape context for interpretation and protection of cultural and natural resources is a primary goal of this study.

The specific purpose of this study is to determine the historic land uses, present day vegetation patterns and remaining historic plant communities at Whitman Mission in order to develop management options for managing or enhancing the cultural landscape, while maintaining the historic integrity of Whitman Mission National Historic Site.

PROCESS

The approach to this study is necessarily interdisciplinary, ensuring authenticity, workable solutions and an understanding of complex management networks. The team includes personnel from the Regional Division of Natural Sciences, Natural Resource Management, and Cultural Resources and from the staff at Whitman Mission National Historic Site.

Representatives of the team met at the park in April 1984 to discuss directions and tasks for the project. Individual reports were then developed by Natural Sciences and Natural Resource Management and compiled over the next two months by Cultural Resources. Another trip to the park took place in June to research park records and files and Whitman College Library. A draft of the report circulated (to the team) in July. With comments and review, revisions were made and a final report came out in September 1984.

There are great advantages to interdisciplinary teams. Each management decision necessarily impacts some other resource, either directly or indirectly. The major objective is always to see the park as a single whole that is made up of unique but interrelated scenes or areas. Given these aspects of the project, the team worked specifically to provide management with useful alternatives to problem areas.

METHODS

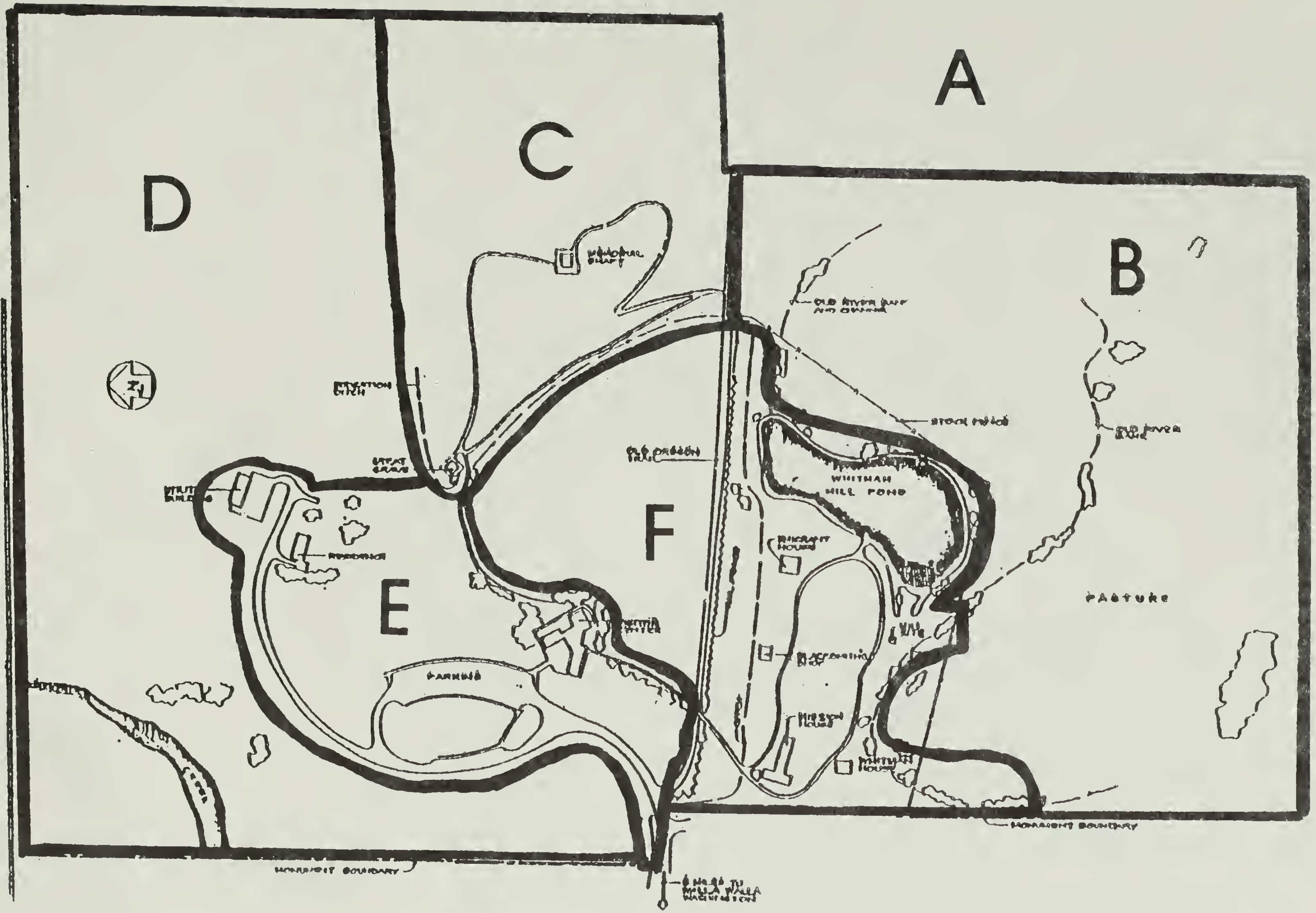
The 98.15 acres that make up Whitman Mission National Historic Site display a diversity of land use, land value, vegetation types and different levels of contribution to the historic scene. Because there are areas of unique character and needs, the team determined early in the project that it was appropriate to consider these land units separately (see Map I). After exploring the history, vegetation patterns and physical character of each and evaluating the historic significance and possible management problems, the individual land areas could be placed back into the context of the entire 98.15 acre historic site. In this manner, development of management alternatives and the subsequent impacts of such alternatives always occur in the framework of the park as a whole system. Ultimately as one views the park, there should be a thematic, visual and material flow from one area to another.

Finally, although the park is relatively small, any attempts to re-establish native vegetation to what it was during the Whitman period would be a difficult, or perhaps impossible, task. "Changes in the water table alone may preclude any such attempt" (Starkey, 1984, Vegetation Management Options: Whitman Mission National Historic Site).

Perhaps the key to a Vegetation Management program is best pointed out in the Park's Statement for Management, " . . . to maintain as nearly as possible, the visual aspect of historic period to be commemorated."

In so doing, and referring to the park as a whole, concerted effort to replicate the vegetation species (perhaps even genus) of the period will not be undertaken except where scientific investigation would indicate strong potential for success. Effort toward approximation of similar cover and the presentation of that "visual aspect" of the historic period previously referred to is the overall goal.

All scenarios developed are based on existing base data (see Bibliography) including the current Resource Management Plan, Statement for Interpretation and Statement for Management developed by the Park staff.



MAP I. Six Land Units of Whitman Mission National Historic Site

LAND UNITS OF WHITMAN MISSION

AREA A

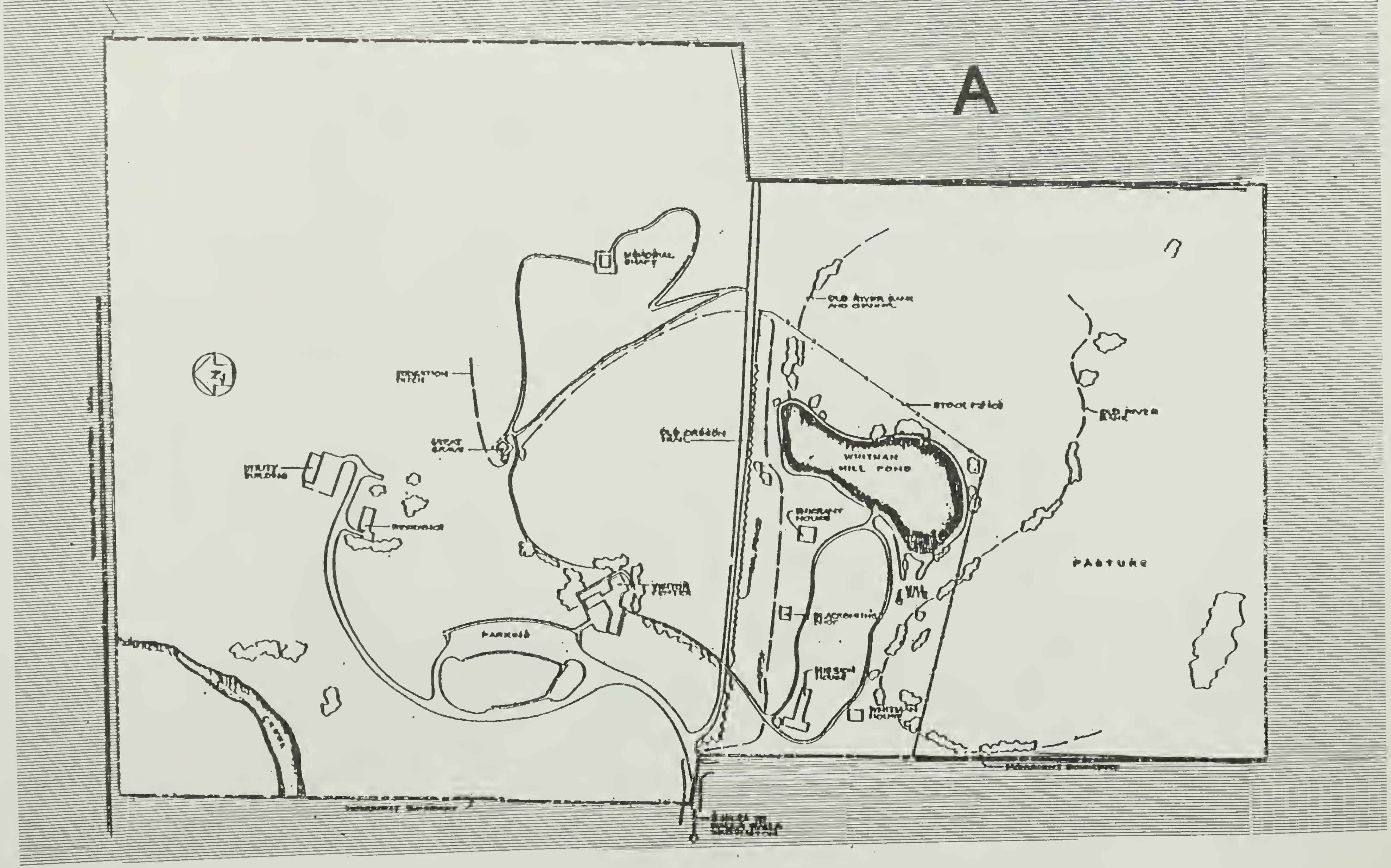
BOUNDARIES

Area A is included as an individual land unit in this study even though it is outside the current park boundaries (see Map II). Conceptually, the area is a broad circle around the park that expands and contracts according to visual limits, natural buffers and boundaries. In a sense Area A is the greater context in which Whitman Mission National Historic Site is located. It is perhaps best understood from the top of the Shaft Hill. From that vantage the panorama unfolds south to the Walla Walla River and hills beyond, east to the Blue Mountains, north toward Highway 12 and cultivated hills, and west across the low level farmland that extends to the horizon.

The primary features of Area A include the viewshed itself, Mill Creek, the Walla Walla River and the large patchwork of farm land and pasture lands.

View from Shaft Hill looking SW

View from Shaft Hill looking NW


A
MEMORIAL SHAFT
IRRIGATION DITCH
GREAT GRAVE
UTILITY BUILDING
RESIDENCE
OLD OREGON TRAIL
VISITOR CENTER
PARKING
OLD RIVER BANK AND CHANNEL
STOCK FENCE
WHITMAN MILL POND
EMIGRANT HOUSE
BLACKSMITH SHOP
MILL SITE
MISSION HOUSE
WHITMAN HOUSE
OLD RIVER BANK
PASTURE
MONUMENT BOUNDARY
MONUMENT BOUNDARY

MAP II. Area A

HISTORY AND CHARACTER

The Walla Walla Valley is in the southernmost portion of the Palouse, a large flat plain bounded by the Oregon hills on the south, the Columbia and Snake rivers on the west, the Snake River on the north and the Blue Mountains on the east. The valley is a triangle, approximately forty miles on each side.

Before white settlers made their way west, the valley was primarily a large expanse of native grassland and shrubs. Local Indian populations were relatively nomadic and often traveled out of the valley to hunt for meat in supplementing the plant diet offered in the valley.

View from Shaft Hill looking south

Migrations of white settlers making their way west in the mid-nineteenth century greatly altered both the cultural composition of the valley and subsequent physical character. By 1850 the land in the valley was open for settlement. Gradually the climate and rich soil became the shaping force as the valley evolved from a series of isolated outposts into a productive and vital agricultural area. Today the patchwork of farmland mixes with small towns and larger communities to create a dynamic rural working landscape.

LANDSCAPE CHANGES

As mentioned above, the local Indians probably occupied the valley and areas immediately around Whitman Mission, at least periodically, for centuries before the Whitmans arrived. Primarily nomadic hunters and gatherers, the Indians had a minimal impact on the land immediately around them and, with the exception of occasional burning, did not profoundly alter the landscape.

In contrast, the establishment and subsequent development of Whitman Mission had a tremendous impact in direct and indirect ways. For example, Dr. Whitman, knowing that self-sufficiency was the key to survival in this wilderness, planted crops almost immediately. The crops needed water and soon an irrigation system diverting water from nearby creeks was in place. The level valley lands surrounding the mission site were deemed suitable for livestock and, perhaps for the first time, native grasses were grazed by domestic livestock. Accustomed to wood structures, the Whitmans initially cut much of the riparian vegetation along the Walla Walla. Unsuitable as wood for building houses it was used as firewood and occasionally used for building furniture.

In addition, the location of the mission on the Oregon Trail made it a natural stopping place for those making their way west. Settlers and pioneers brought belongings and supplies from various regions along the way and often traded what was left available, for new supplies provided by the Whitmans. The combination of a large number of emigrants passing through the site and the introduction of non-indigenous materials, left abundant opportunity for a significant pattern of change (both culturally and ecologically) in the landscape. It was an active and dramatic changing of the land, that must have seemed quite necessary to the early settlers. The introduction of domestic livestock, exotic plants, agriculture and the removal of native vegetation may have been, for the time, the fabric of survival for one culture.

PRIMARY CONCERNS

Since Area A is outside the current park boundaries, cultural, ecological and resource management concerns remain chiefly out of the control of park management. There are, however, some general concerns that should be addressed at least on a conceptual level.

Cultural

1) That viewsheds from within the park to outlying areas be maintained
2) That areas surrounding the park that are significant historically or significant as buffers for protecting visually the historic scene presented by the park be preserved either by purchase of development rights, scenic easements or outright acquisition of designated lands

3) That the interpretative effort from the top of Shaft Hill speak somewhat to the surrounding landscape outside of the current park boundaries in order to set a physical context for the mission itself

Natural Resources

1) Backdrop vegetation (farm/grazing land)
2) Walla Walla River
3) Mill Creek

Resource Management

1) Environmental Assessment Compliance
2) Screening of turkey barns from inside Area F (east boundary) or acquisition of land and subsequent building removal
3) If acquired, weeds and exotics are a problem

Management Alternatives

1) Live with exterior scene as is
2) Distinctively fence (rail) and define current Whitman Mission boundary
3) Acquire certain lands and remove offending structures
4) Plant native or other desirable vegetation to screen buildings west of Core Unit F

AREA B

BOUNDARIES

Area B includes approximately twenty-seven acres of level pastureland south of the mission grounds (see Map III). The area is defined on three sides (east, south and west) by the park boundary, and along the north by the restored millpond, fence and a portion of the Oregon Trail. All of the land in Area B is part of a larger tract (37.21 acres) acquired by the park in 1937.

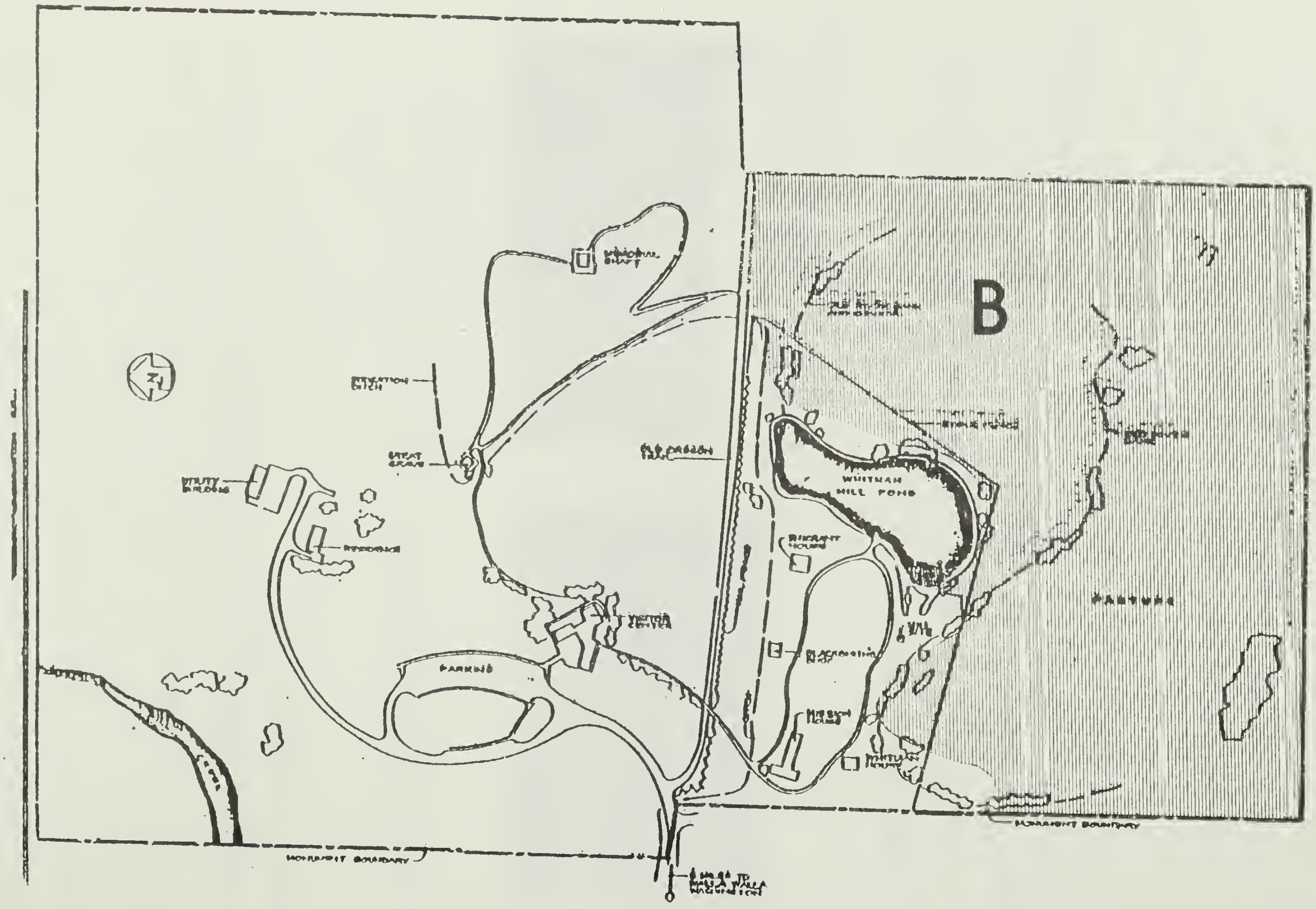
Its primary features include the old oxbow of the Walla Walla River and a large level tract of pastureland.

View of Area B from Shaft Hill

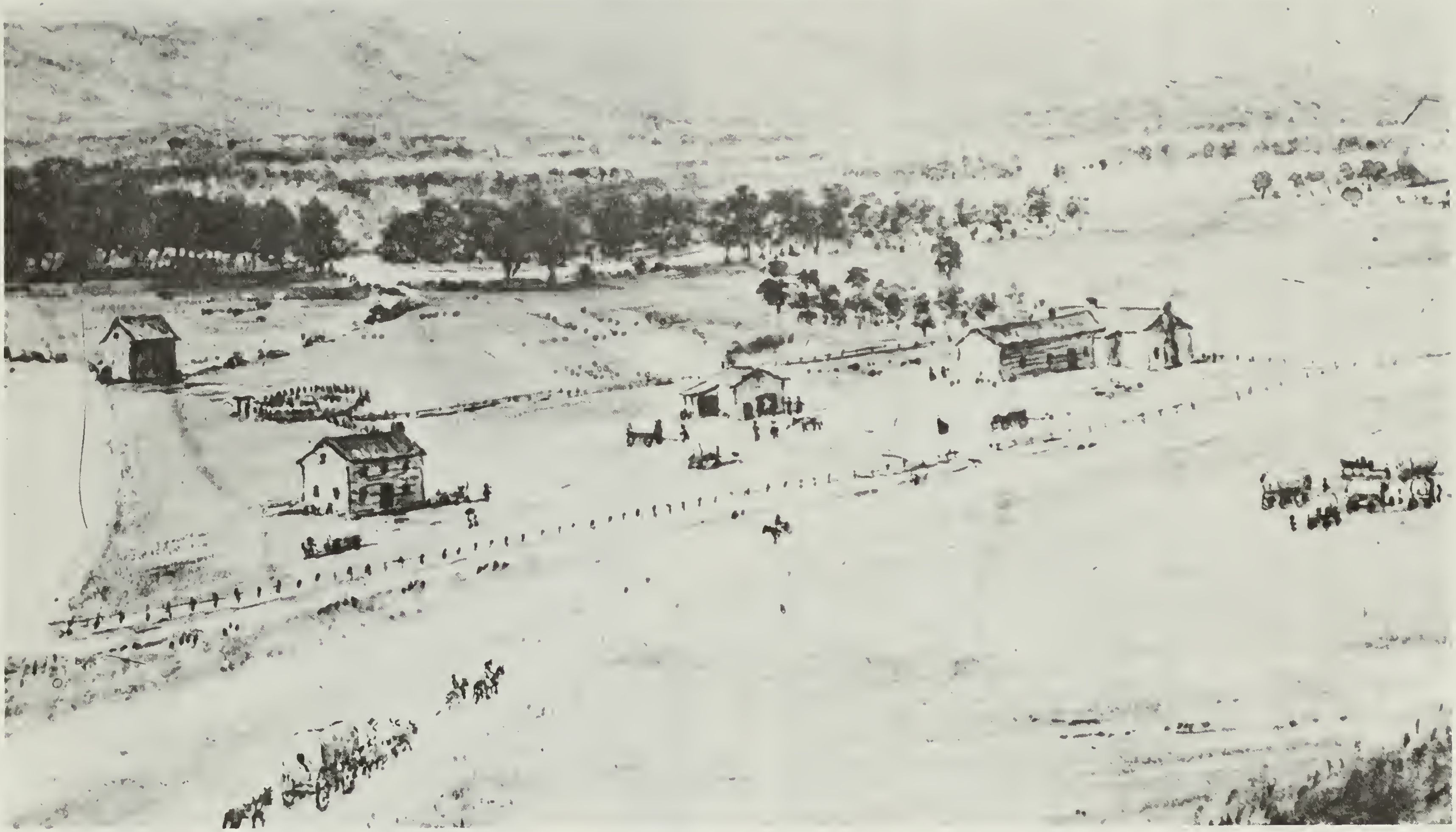
View of Area B from historic core

HISTORY AND CHARACTER

Historic evidence suggests that the Whitmans used portions of this land for grazing cattle, sheep and hogs raised at the mission. Verbal descriptions and drawings from those who lived in or passed through the mission, describe a fenced corral in proximity and adjacent to the area (see photograph). In addition since the Whitman's livestock holdings



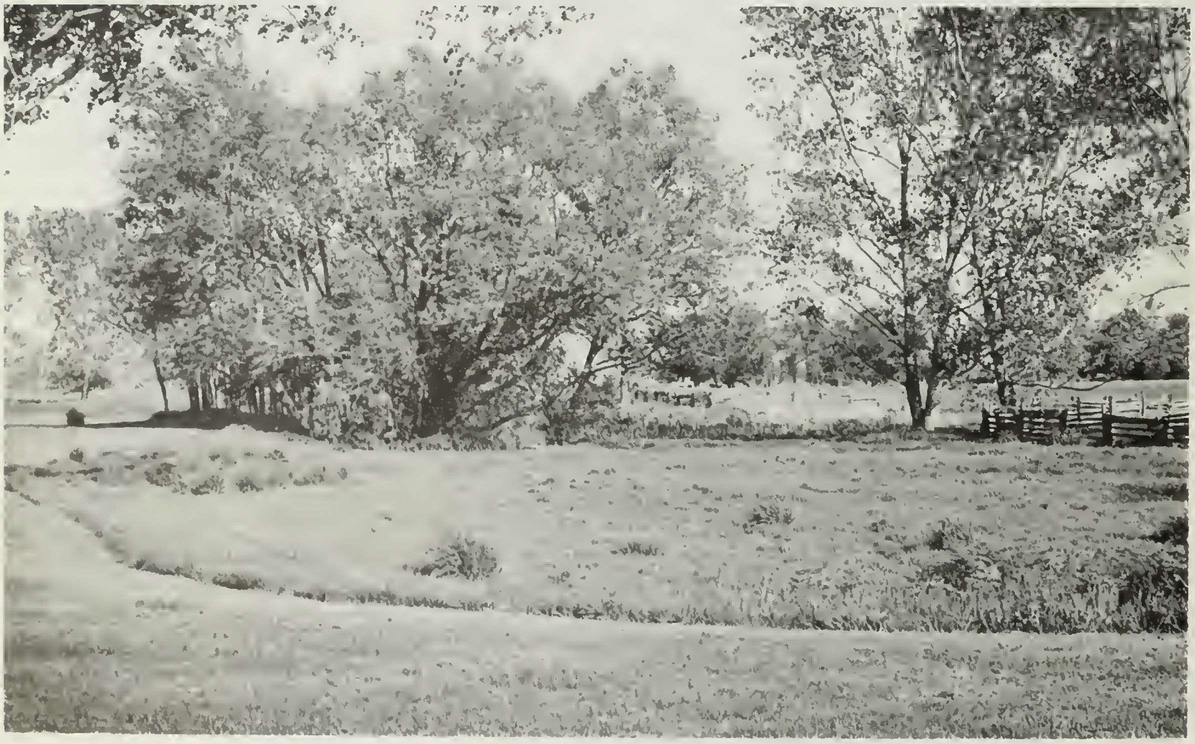
MAP III. Area B, South Pasture



Drawing of Waiilatpu by W. Henry Jackson, drawn in 1930.

were so extensive (290 head of cattle, 46 horses, and 92 sheep by 1846) and land due west of the mission was primarily cropland and distant from animal holding pens, this land would provide the only suitable pasture area. A profile of historic plant communities at Whitman Mission by Wright in 1982, indicates a vegetative cover conducive to grazing in parts of the pasture. A mix of native perennial grasses, clumps of giant ryegrass and a band of riparian vegetation (willows, cottonwoods, elderberry and other species) following the oxbow of the Walla Walla River (see below) most likely dominated the area.

At the time the mission was established in 1836, an oxbow of the Walla Walla River flowed over this area and close to the first house built by the Whitmans. The river has since moved south but its location is significant historically in large part because it was in that channel that Alice Whitman (the Whitmans' only child) drowned in 1839.



The oxbow of the Walla Walla River as it appears today

LANDSCAPE CHANGES

The most significant and conspicuous changes in Area B since the Whitman era is the modified course of the Walla Walla River and the change in vegetative cover.

Over the years the river channel progressively moved south until today it is not a visual factor contributing to the historic scene. In addition, as the river meandered south, the water table in Area B also changed, impacting vegetation patterns.

Historic photographs of the area indicate that the land in Area B has been grazed by cattle and horses at least since 1936, as a result the ground is relatively compacted. The northern half of the field has also supported crops such as corn. More recently, the land has been leased for cattle grazing by a neighboring farmer under a special-use permit. The pasture has been seeded to forage species such as bluegrass and clover, and it has been irrigated in order to maintain pasture quality.

PRIMARY CONCERNS

The land in Area B, though substantially changed, has retained a primarily pastoral character since the Whitman era. It is recommended that this area remain pastureland or pasture-like to the degree it retains a pastoral character suggestive of the historic scene.

Cultural

1) That the pastoral character and visual quality of the area be maintained
2) That views to the area from the mission grounds (Area F) and Shaft Hill (Area C) be maintained

3) That new materials used in Area B, like fences and plants, be historically appropriate or similar (in kind) to materials used elsewhere on the mission grounds

4) That new materials, incongruous with the historic period (1836-1847) like irrigation practices, farm machinery and other contemporary equipment, be screened or used so as not to conflict with park visitor experience

5) Restrict visitor access to Area B

6) Fence eastern park boundary (rail)

Natural Science

1) Determination of grazing densities and related land management alternatives appropriate to maintaining the historic scene

2) Determination of appropriate vegetative cover, based on above

Resource Management

1) Control of Noxious Weeds

2) Control of grazing

3) Define old oxbow of Walla Walla River

Management Alternatives

Alternative 1. Restore Original Vegetation

(Bluebunch wheatgrass - Agropyron spiceyum - sandberg blue-*Poa secunda* - Riparian woodland with grant rye - Wright 1984)

-- River channel changes since historic time; water regimen change. Vegetation disruption through historic and present use--planted to pasture (forage) species of bluegrass and clover. Restoration difficult or impossible.

Alternative 2. Seed to tall wheatgrass (Agropyron elongatum), fence into three pastures, and rotate grazing.

-- Disking required, plus irrigation during establishment. Disruption of Scene B, pasturing during establishment. Fencing of separate pasture and animal rotation would impinge scenically. Use by livestock at a lower rate than Alternative 4 & 5, but same as Alternative 3.

Alternative 3. Seed to tall wheatgrass and use as single pasture.

-- Would require same initial treatment as wheatgrass establishment procedures in Alternative 2, but presentation of stock would be more historically compatible and like Alternative 2, irrigation after establishment would not be required. Period of use of lessee would be reduced as would stock numbers.

Alternative 4. Utilize existing pasture, construct fences (multi-pastures), and develop rotational grazing.

-- Increases productivity, decreases erosion, palatable and unpalatable forage taken, nitrogen returned to the soil from legume component. Needs distracting (historic scene) fencing. Is high rate of use/subpasture animal presentation not the free-pasture, historic use. Would require continued irrigation (night time).

Alternative 5. Continue current management program, but adjust stocking rates and season of use to reduce impact.

-- Would require irrigation (night time) and development of a compatible-use plan to reduce localized impacts caused by "noncontrol" prior-use grazing. Presents a scene more historically accurate. Can be manipulated as Alternative 4 if need arises (impact). Or conversely, Alternative 4 could be inaugurated first to decrease erosion, control unpalatable vegetation and promote palatable--then revert to Alternative 5. Action (Alternative 4) could develop as a use pattern by lessee that would be difficult to cut off.

AREA C

BOUNDARIES

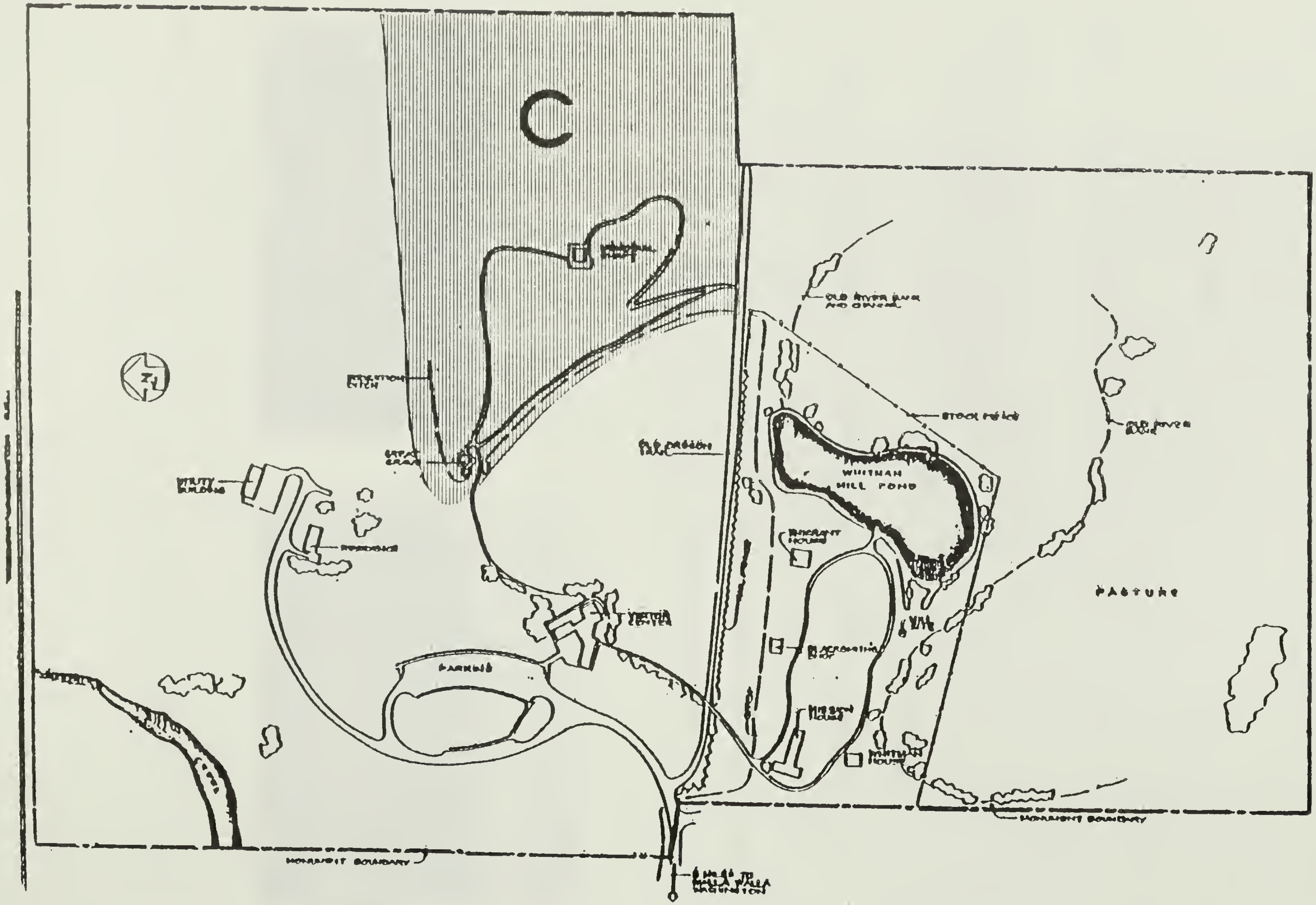
Area C includes approximately eight acres and the hill known as Shaft Hill (see Map IV). Shaft Hill is part of a geological terrace rising almost 100 feet above the mission grounds. Its boundaries along the south and east are the established park boundaries. Along the base of the hill to the north and west are irrigation ditches defining the other two boundaries for this land unit.

Shaft Hill became part of Whitman Mission National Historic Monument in 1939. It was the second land acquisition bringing the total park acreage to almost 53 acres.

Primary features in this area include: the east entrance to the park, paved walkways, two irrigation channels, Pioneer and Indian cemeteries, the Great Grave and Whitman Monument (1897) and the Alice Clarissa marker along the northwest toe of the hill.

View to Shaft Hill from core area looking northeast

View from Shaft Hill looking north



MAP IV. Area C, Shaft Hill

HISTORY AND CHARACTER

Written accounts indicate that this hill was frequently used as a vantage point for mission residents awaiting the return or arrival of parties traveling west. There is no record of any structures on the hill until after the Whitman era. The Whitmans did use some structural devices to divert a portion of Doane Creek along the north edge of the hill, creating an irrigation channel, carrying water along the west toe of the hill and onto the mission grounds.

In the early 1860s and 1870s pioneers in the valley used an area at the base of the hill as a burial ground. In addition an Indian burial site is located adjacent and a few yards from the Great Grave (see below). Today most of the markers in the pioneer cemetery no longer exist and the sites themselves are marked by a single sign along a nearby path.

In 1897, on the fiftieth anniversary of the Whitmans' death, Mr. and Mrs. Marion Willard Sivegle donated eight acres of their land (Shaft Hill) to a group interested in maintaining the historic mission site. On this land, two memorials were built. One, the Great Grave, contains the remains of those killed in 1847. The thirteen names are carved on a large marble slab and the marker is surrounded by a wrought iron fence. Another grave, holding the remains of Mr. and Mrs. Grey, is located directly adjacent to the Great Grave.

Another commemorative effort in 1897 was the construction of a memorial shaft on top of the hill. Twenty-seven feet tall and inscribed with the name Whitman, the monument was dedicated November 29, 1897, and like the Great Grave is surrounded by a low wrought iron fence.

In the 1950s another marker commemorating Alice Clarissa Whitman was placed along the west base of the hill "allegedly" near the spot where the Whitmans' only child was buried.

The Great Grave

Whitman Memorial on top of Shaft Hill

LANDSCAPE CHANGES (1847-1897)

There is a gap in the historic record of specific changes on Shaft Hill, but since the early 1900s the vegetative cover on Shaft Hill has changed frequently. Originally composed of native grasses (bluebunch, wheatgrass and Idaho fescue) and scattered shrubs (sagebrush and rabbit brush), the hill currently has several weeds and exotic grass species (chrysothamnus and wheatgrass).

Photographs from the early 1930s show a series of drastic changes (see Wright) in plant composition. At one point the hill was covered entirely by short grasses with scattered shrubs along the roadside. A 1936 photograph shows taller bunch grasses invading the site. In 1950 the top of the hill was cultivated for crop production. Since then, various other ground disturbances have occurred and the result is a vegetative cover of exotic grasses and weeds common in dry grassland communities under such stresses. Erosion of areas due to visitors 'shortcutting' between established paved paths also continues to impede establishment of desired grasses.

All of the historic markers and monuments currently are maintained with the exception of the Indian cemetery, which is not sufficiently marked or delineated.

PRIMARY CONCERNS

Shaft Hill itself, along with the monuments and historic grounds remain significant cultural resources. It is recommended that the park maintain these resources. Management alternatives for this area will focus on revegetation options aimed at creating a more historically appropriate plant community.

Cultural

1) That the east entrance to the park be upgraded
2) That all three primary markers and monuments in this area--the Great Grave, the Memorial Shaft and the Alice Clarissa Whitman stone--be maintained
3) That interpretation of the Pioneer cemetery be upgraded
4) That all viewsheds to and from the area be maintained
5) That interpretation of the Indian burial site be consistent with the Native American Religious Freedom Act and the wishes of the Confederated Tribes of the Umatilla Indian Reservation

Natural Science

1) That alternatives be developed for re-establishment of native grasses or appropriate vegetative cover suggestive of historic period, at least along trailsides
2) Replace with riparian vegetation or appropriate native species along irrigation channel on west toe of hill. Lower profile vegetation would be more compatible with the historic scene. Tall trees tend to separate core area from hill

Resource Management

1) Control of noxious weeds and non-native grasses
2) Control abundant pocket gopher population
3) Control visitor trail 'shortcutting'
4) Replacement of vegetation along diversion ditch be appropriate for maintaining bank stabilization

Management Alternatives

Area C - Shaft Hill Revegetation

Alternative 1. Re-establish original native vegetation.

(Bluebunch wheatgrass and Idaho fescue with an admixture of scattered rabbitbrush and big sage)

-- Natural vegetation disruption through cultivation and other man-caused impacts has removed all but remnant of original native vegetation. Area C has been invaded by wheatgrass, canary grass, and other exotics; rabbitbrush is present in disproportionate amounts. There is an abundance of pocket gophers. The task of restoration is all but impossible but could be attempted.

Alternative 2. Reinforce establishment of native species.

For example bluebunch wheatgrass where now growing in selected areas on the south-facing slopes along the established trail. Conduct research and explore means for reestablishment of Idaho fescue on drier slopes, enhancement of other native species, as well as exotic plant reduction, control of "increaser" species and pocket gophers, and noxious plants.

Alternative 3. Maintain present "shady lane" character or trail between Units C and F (core area) with stature trees by transplant of similar species as current trees become hazardous.

Alternative 4.

-- Replace irrigation ditch species with shrub-like native/non-native species that act as bank stabilizers, but permit more open view of adjoining units.

AREA D

BOUNDARIES

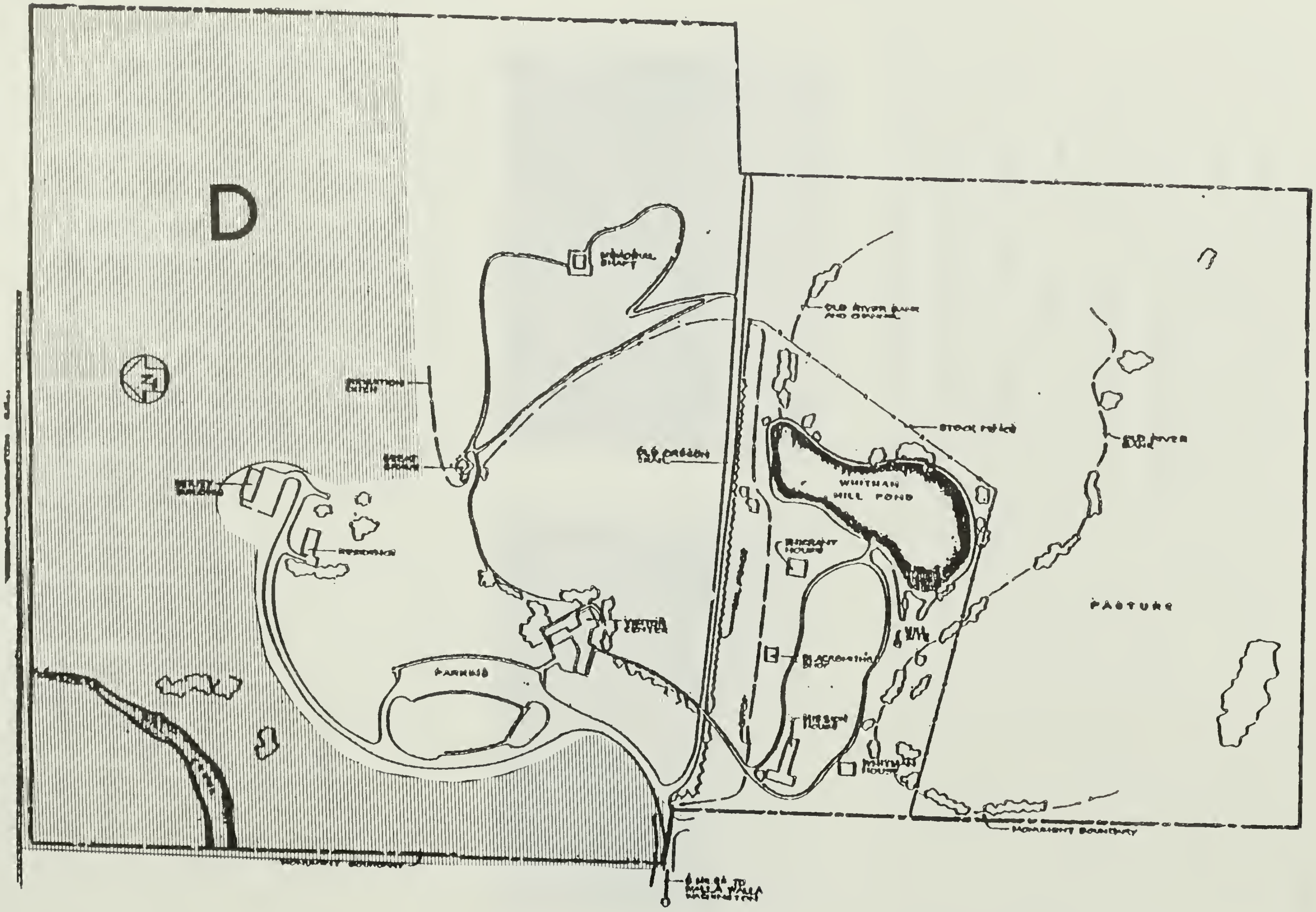
Area D includes approximately forty acres in the northernmost portion of the park (see Map V). The area is defined on the east, north and west by the current park boundary. The southern boundary follows Shaft Hill, an irrigation ditch (Doane Creek), the park maintenance facilities and service road leading eventually to the west park entry. The land in Area D was acquired in 1959 as part of a larger (46.7 acre) tract. The primary features include a large tract of mixed grassland and a small portion of Mill Creek which cuts across the northwest corner of the area.

Grassland cover of Area D

Area D viewed from Shaft Hill

HISTORY AND CHARACTER

As the last acquisition of land to Whitman Mission National Historic Site, the absence of historically significant events or aspects relating directly to the Whitman era is not surprising. Considered as a subzone to the primary historic area, the land in Area D principally serves as a physical buffer between future development along Highway 12 and the historic portion of the site.



MAP V. Area D, Northern Grasslands

LANDSCAPE CHANGES

Originally a mix of native perennial grasses in the higher areas and riparian vegetation along the wetlands, the vegetative cover in Area D has changed quite dramatically. Changes over the years are due to a variety of factors including changes in the water regimen, tilling practices, grazing and other major human impacts and disturbances. As a result the area is filled with exotic species and noxious weeds.

PRIMARY CONCERNS

Because Area D is a subzone to the historic site it is recommended that management options be directed toward establishment of a quality grassland community, suitable for maintaining a pastoral scene.

Cultural

1) That a grassland character be retained for visual continuity relating this area to the entire park
2) That development scenarios be considered along Mill Creek for interpretive or other visitor-related activities

Natural Resources

1) Eliminate noxious weeds
2) Develop alternatives for establishment of a suitable grassland community

Resource Management

1) Control noxious weeds
2) Control ground squirrels and pocket gophers

3) Maintenance schedule for diversion ditch and Doane Creek

4) Remove current ground cover and replace it with a more desirable or compatible one

Management Alternatives

Alternative 1. Re-establish native vegetation.

-- The re-establishment of native vegetation is not feasible because of previous man-caused disturbances. It is an admixture of noxious weeds and nondesirable grasses with a high gopher population. Columbia ground squirrels are also present.

Alternative 2. Retain present situation

-- With nondesirable exotic/native grasses and noxious weeds. Control weeds by chemical application.

-- Grass species present are unable to compete with noxious weeds at present. Spot control of weeds by chemical means opens more area for reseeding of same. Half measures for or desirable grass cover establishment have been unsuccessful. Without an aggressive approach to site preparation and application of integrated pest management techniques to re-establishment of a desirable cover type, maintenance of a desirable cover is not possible.

Alternative 3. Establish a stable non-native grassland community.

-- Site preparation will have to be accomplished. Existing vegetation would be disked in the fall, followed by herbicide treatment of regrowth, followed by spring disking, harrowing, packing and seeding, or summer fallowing and fall seeding.

-- The above would remove the current vegetation cover, and two years of fallowing and herbicide treatment would cause a considerable reduction in pocket gopher populations.

-- Seeding with native/non-native desirable vegetation would occur. Nondesirable vegetation would be removed at the expense of a small amount of wind erosion to the soil. Pocket gopher numbers would be lowered, and a good vegetation recovery of grasses could be expected. This alternative may require irrigation during the first growing season.

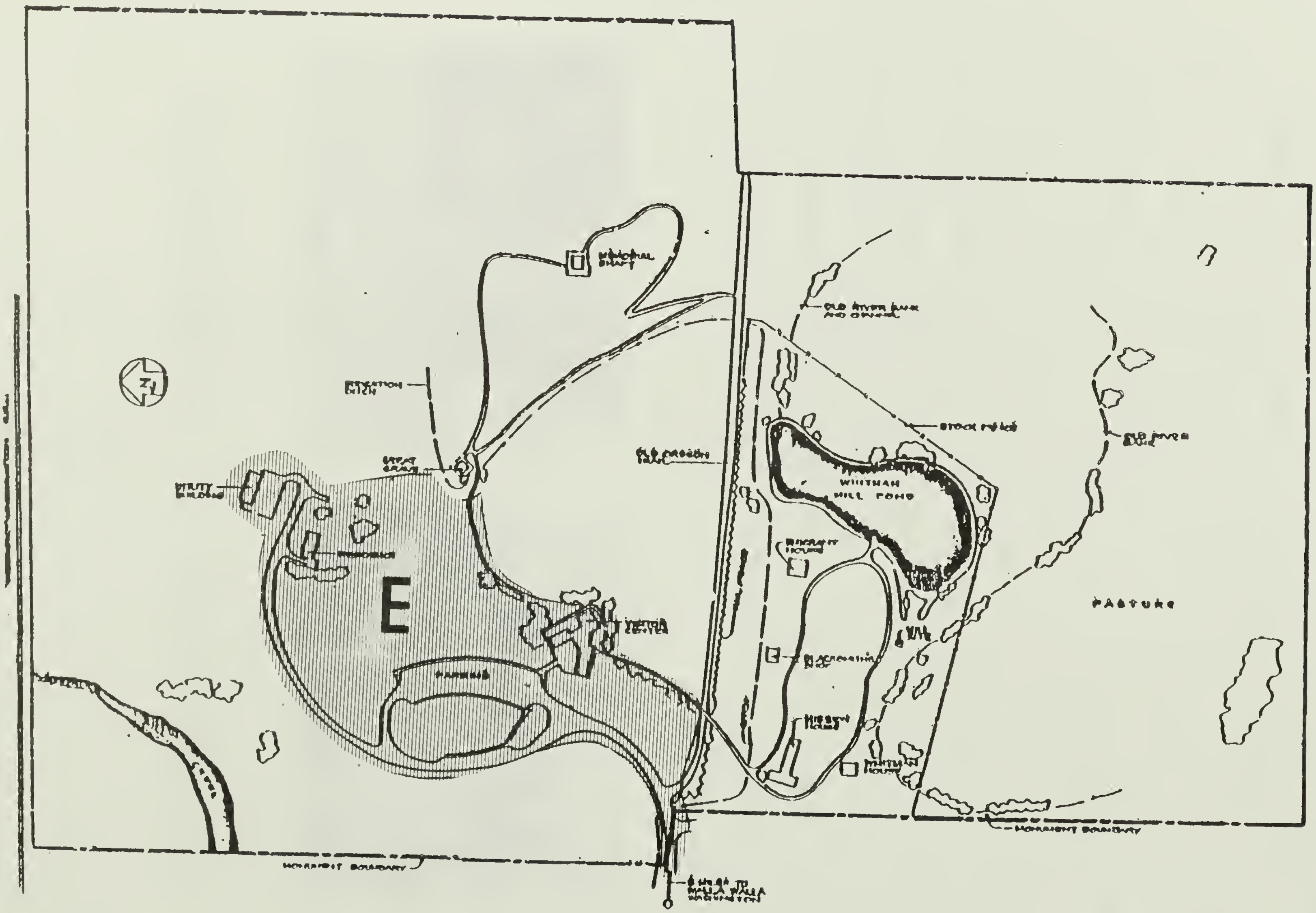
AREA E

BOUNDARIES

Area E includes approximately seven acres of land in the central portion of the park. The land was acquired in 1959 as part of the larger track (Area D - approximately forty acres, see above). Area E is also a subzone to the historic core and contains the park maintenance, service and visitor facilities. The boundaries for Area E include the concrete path along the southeast, linking the mission grounds and Great Grave, the maintenance buildings along the north, the service road and parking areas along the west and the Oregon Trail/park entry along the south/southwest (see Map VI). Primary features of this area include the west park entry, the visitor center, several paths and directional markers, interpretive focuses, picnic area, parking area, maintenance shop and residence.

Visitor administration building viewed from historic core

Path from Visitor Center to Great Grave and Shaft Hill



MAP VI. Area E, Administrative Area

HISTORY AND CHARACTER

Research findings failed to reveal any events or matters of historic significance (occurring during the Whitman era) directly relating to this area. The primary character of the area (since its acquisition) has been shaped by development of the visitor/administrative/maintenance facilities.

LANDSCAPE CHANGE

Acquired for a specific purpose, this area developed in accordance with the Park Master Plan. Consequently, the vegetation is primarily composed of non-native trees, shrubs and flowering plants suitable to the climate.

The park staff maintains the grounds immediately around the visitor center to the degree that lawns are trimmed and irrigated, flower beds are annually planted and mulched, and a general manicured appearance is kept. Non-native grasses are present in lawns and "semi-wild" areas.

PRIMARY CONCERNS

The administrative character of Area E is appropriate to the current needs of the park. Many areas have multiple functions and uses. For example, many use the shady lawns near the visitor center as an outdoor gathering place. The parking lot is also a rest area and meeting place, and the picnic tables north of the visitor center extend the uses of the grounds to a family-oriented recreation area.

Management alternatives will therefore be directed toward maintaining current uses and facilities with improvements when necessary.

Cultural

1) That the west entry to the site be visually improved
2) That the number of exotic trees and introduced plants be reduced and replaced with native species
3) That views into this area and out be carefully developed
4) That contemporary structures (to the historic scene) be well screened
5) That pedestrian and vehicular circulation continue to be safe and functional

Natural Resources

1) Develop alternatives for revegetation of areas to native cover

Resource Management

1) Control noxious weeds
2) Control undesirable grasses
3) Control pocket gophers
4) Establish mowing perimeters

Management Alternatives

Alternative 1. Restore native vegetation.

-- This is the entry to the park and by the very nature of it (developed and landscaped) has within it the accouterments of such an area. Prior to present day development it suffered human impact and land uses that removed all but vestiges of native vegetation. Restoration is not achievable, nor is it necessarily desirable. Area E is the park entry, and it is in part landscaped. This includes non-native trees, shrubs, flowering plants, and turf.

Alternative 2. Maintain current vegetation cover, but control noxious weeds and undesirable plant and animal species.

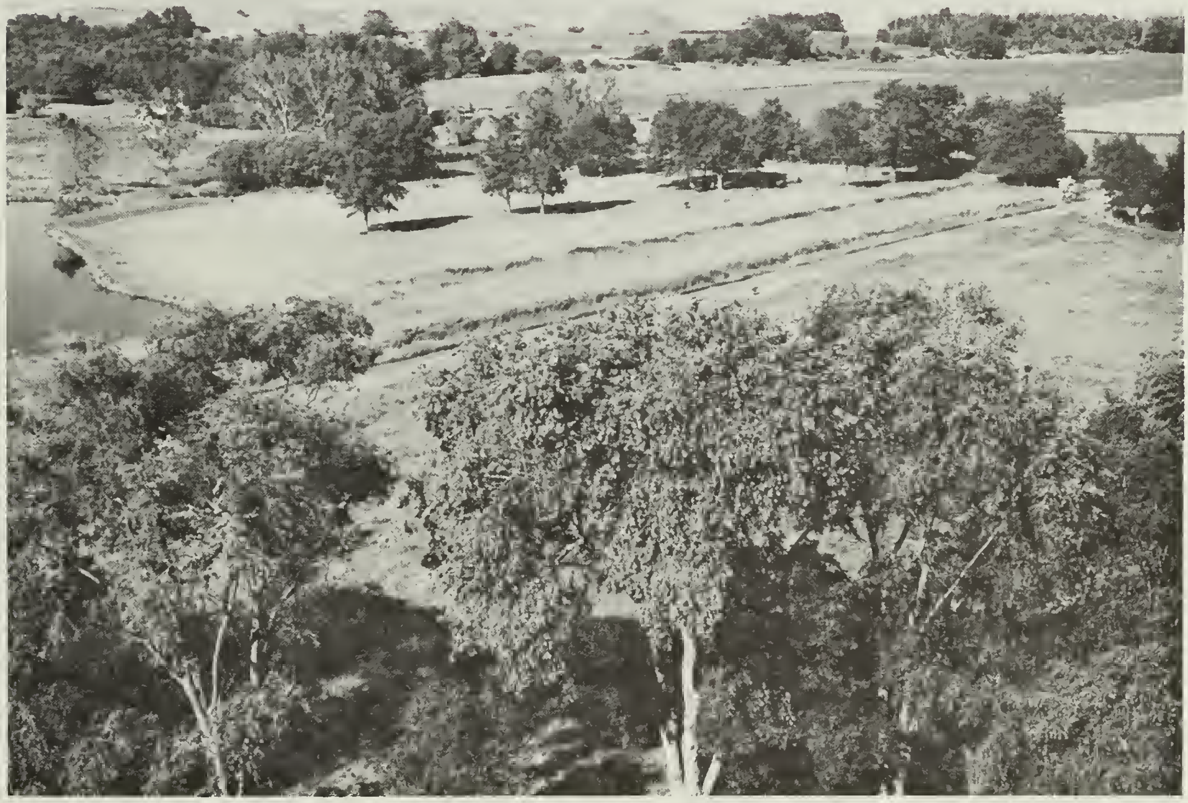
-- The use of chemical, cultural, mechanical, and other pest management techniques to achieve the desired developed area presentation should be employed.

-- This will include mowing in areas of special visitor use (picnic, parking, visitor's center, etc.), employee dwellings, and maintenance shops. The use of selective herbicides along fence rows and road edges, and the replacement of non-native trees with native species at times when feasible (overmature, hazardous, diseased). All of the preceding will cause minor impacts on wildlife habitat (fence rows) and the actual removal of pocket gophers where their control is deemed necessary. This includes necessary mowing in areas where park "entry," memorial aspects, special visitor, and employee use requires such treatment.

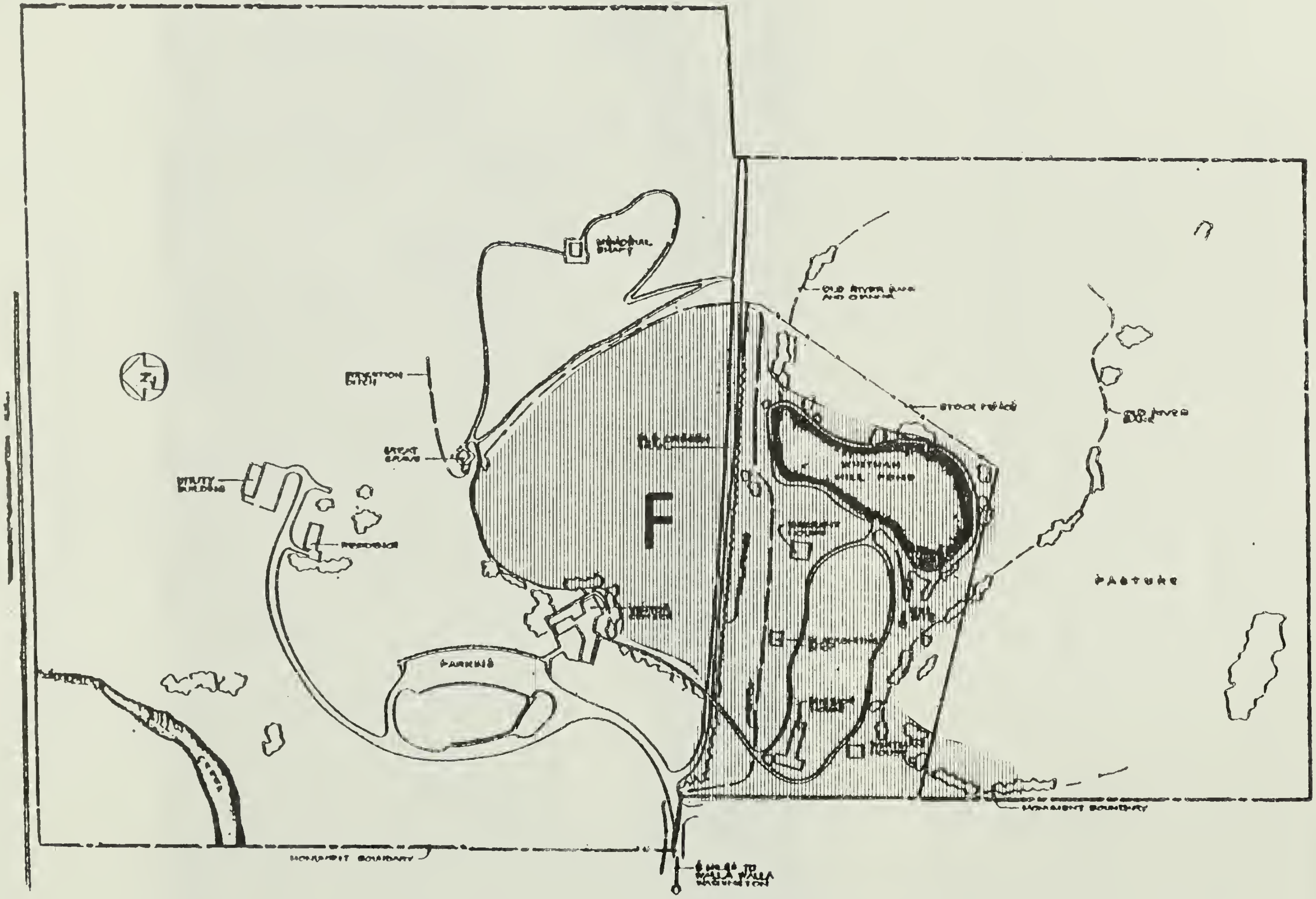
AREA F

BOUNDARIES

Area F includes approximately seven acres and constitutes the historic core of the site (see Map VII). Acquired in 1937 it was part of the first land acquisition establishing Whitman Mission National Historic Site. Boundaries for Area F include: the current park boundary on the west; the fencing delineating the pasture area to the south; the west base of Shaft Hill on the northeast edge of the area; and the visitor center and path along the northwest edge.



View to historic core from Shaft Hill



MAP VII. Area F, Historic Core

HISTORY AND CHARACTER

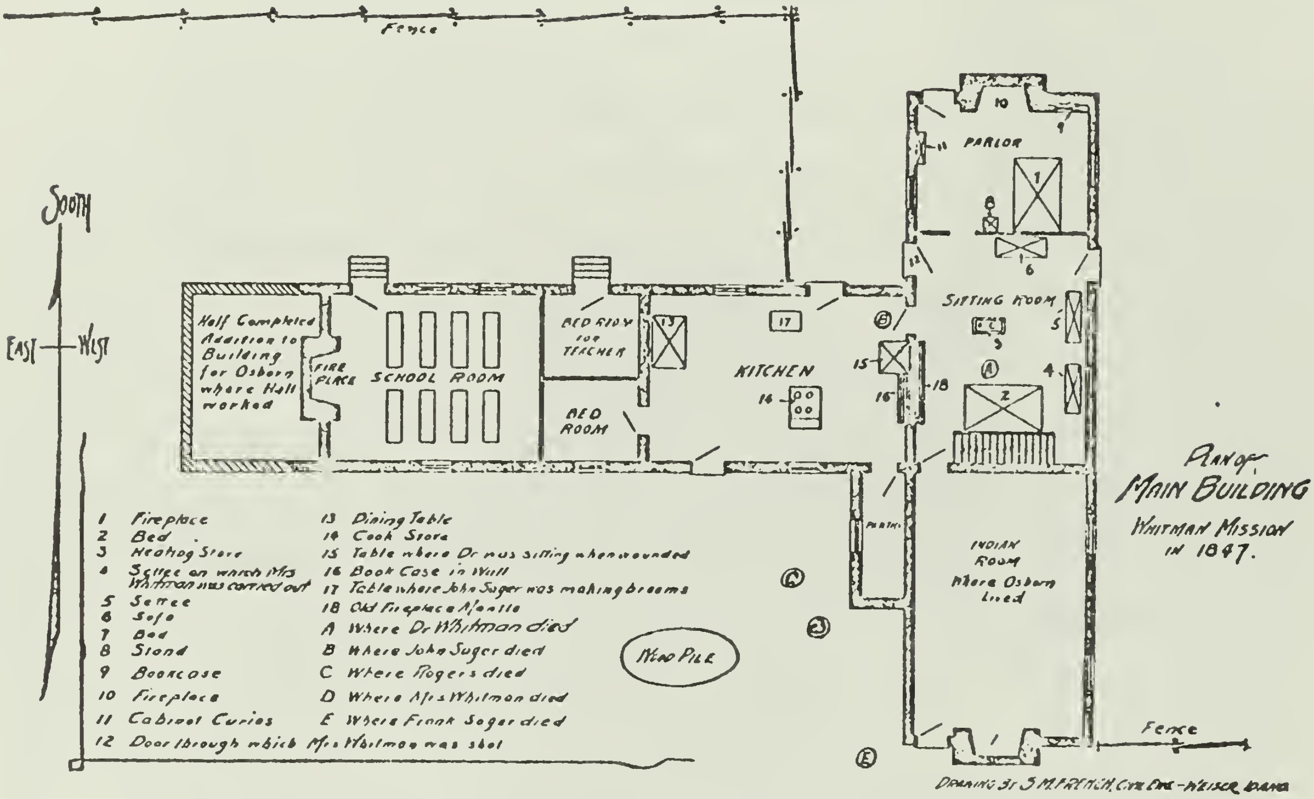
The history and development of Whitman Mission is well documented by many (see bibliography). What follows is a brief summary focusing on the structural development of the grounds.

The mission grounds evolved over an eleven year period of trial and error, differing needs and resource availability. Building construction itself was a slow process as materials and tools were both new to the pioneers and scarce. Accustomed to wood structures, the closest wood for building material was twenty miles away in the Blue Mountains. Adobe, made from earth, straw and water was the primary building source and it was with adobe bricks that Whitman built the first house at the mission. It took several months to construct the simple, lean-to structure, including a fireplace and ryegrass-sod roof. Because of its location on a bank of the Walla Walla River, the house was subject to repeated seasonal flooding and plans were made to construct another house on higher ground.

Narcissa and Marcus Whitman moved into the larger house in 1840. The first house remained standing until 1842 when it was torn down and salvaged materials were used to build the blacksmith shop (see below).

The new house or mission house as it was known, was quite an improvement over the original Whitman home. A T-shaped structure, it not only provided living quarters for the Whitmans, but included a school, a meeting room for the Indians and storerooms. It was in this house that the Whitmans were killed in 1847.

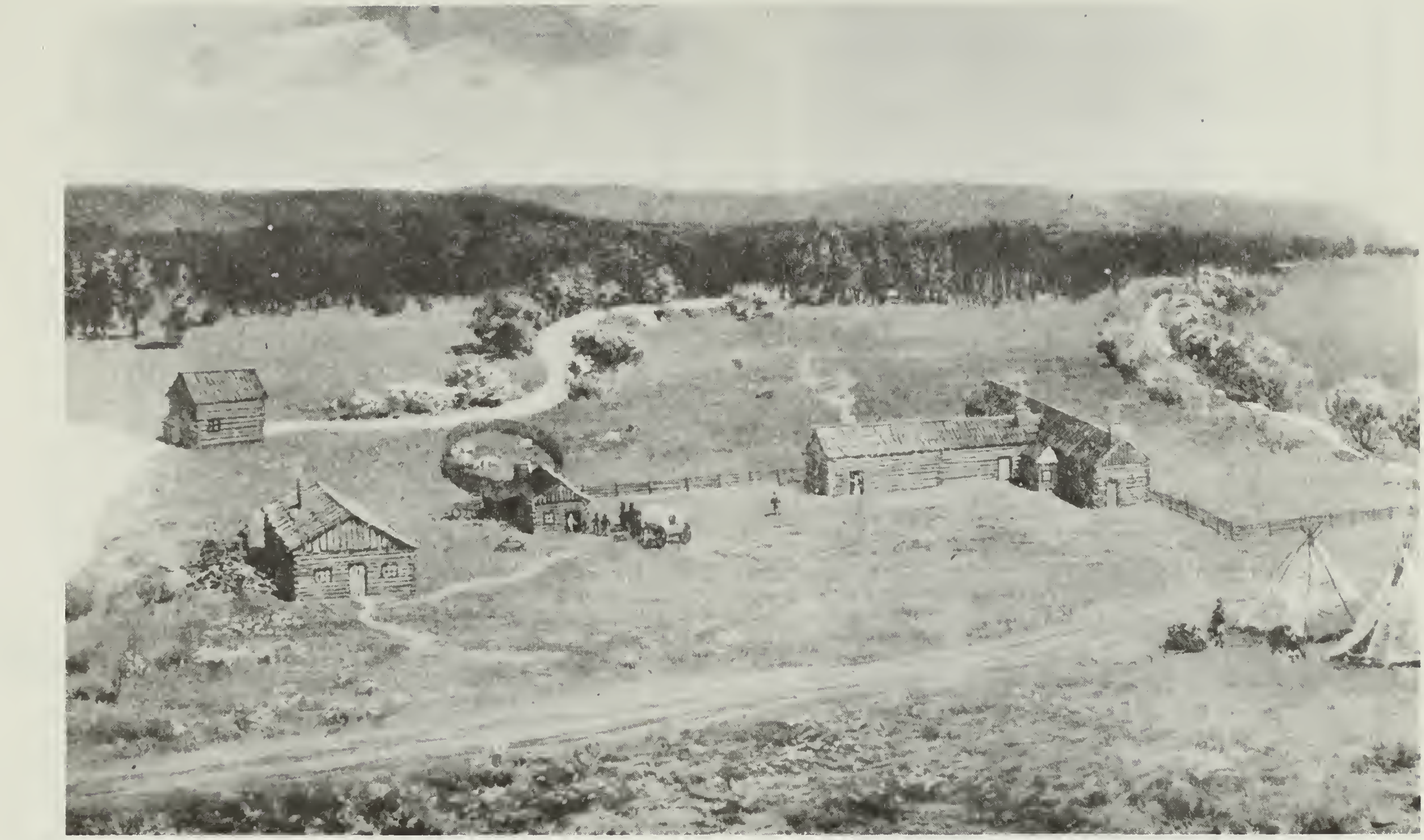
From the 1840s on, the overland migrations to the Oregon Territory increased dramatically. More and more settlers made their way west along what became the Oregon Trail. Whitman Mission, located along the trail, became a major stop for many. The mission not only provided housing and fresh supplies but, by 1842, had a blacksmith shop for making repairs on wagons.



Plan of the mission house drawn under the direction of Mrs. Elizabeth Sager Helm

Built largely from salvaged materials, the blacksmith shop was a two-room, one-story adobe structure approximately 16 x 30 feet. Smithing equipment was sent from the mission at Lapwai after Whitman convinced Reverend Spalding of his need for such a facility.

Around this time, William Gray who spent many of his early years at the mission in Lapwai, began building a house for himself at Whitman Mission. A one and one-half story adobe structure, it was located about 400 feet east of the mission house. Gray lived there with his wife until 1842 when they joined others in the great migrations to the Willamette



Whitman Mission 1843

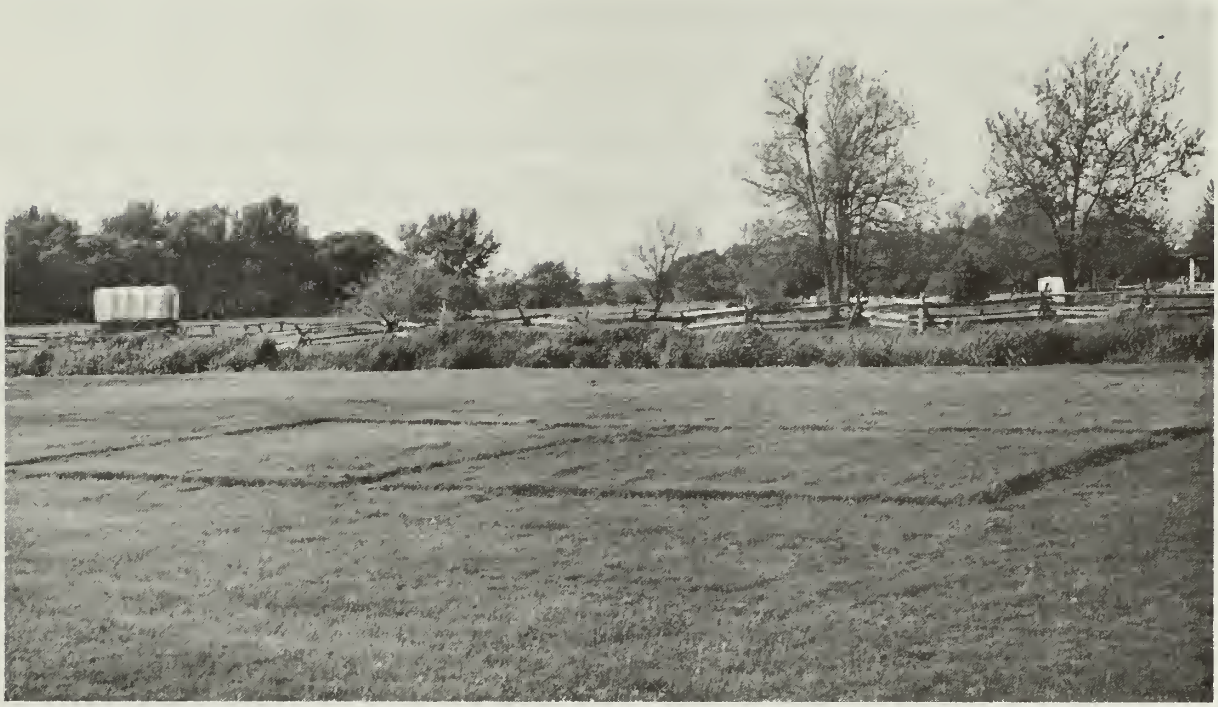
Drawing by Nichols, University of Oregon, Moorhouse Collection

Valley. The house did not remain vacant. Emigrants following the Oregon Trail often stayed at the mission to rest or wait out the hard winter months. At its peak, there were approximately 1,000 settlers passing by the mission, many of whom stayed in the Gray house. By 1844 Whitman found a shorter route that passed through present day Pendleton, Oregon, and only the sick and exhausted stopped at the mission.

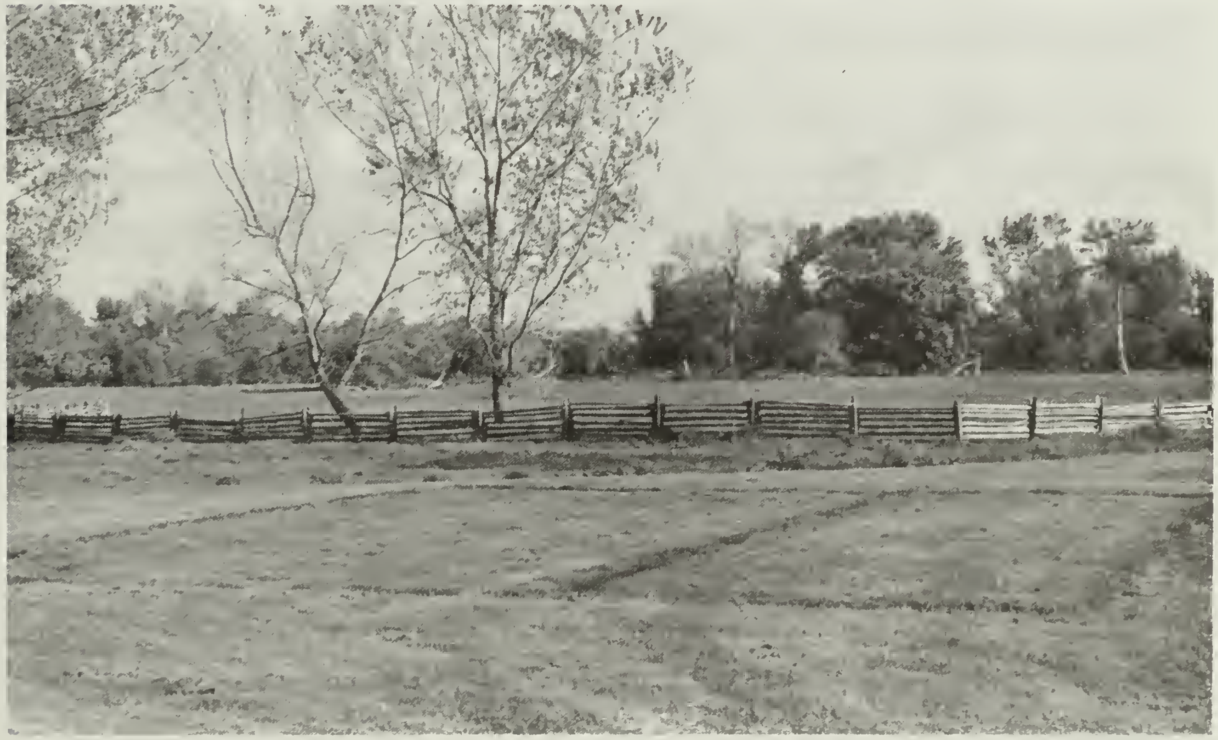
In Whitman's continuing effort to make the mission self-sufficient, several support structures and farming-related systems developed. Water was diverted from a nearby creek and an irrigation channel created to carry water to crops of wheat, melon, squash, asparagus, tomatoes, peas and cucumbers. By 1847 in addition to a relatively large fruit orchard Whitman had approximately forty acres west of the mission grounds under cultivation. As early as 1839, the grain produced in the fields was milled on the mission grounds. Over the eleven years at Waiilatpu Whitman built three gristmills, each larger than the one before.

The first gristmill was operating only three years after Whitmans' arrival. The second mill, built by William Grey, was a significantly more sophisticated structure due in large part to Grey's skill as a carpenter. It was destroyed by fire in 1842. The third and final mill was finished in 1844. The largest of the three, its stones were some forty inches across and produced enough flour and meal not only for the mission residents and neighboring stations, but for travelers anxious to replenish their supplies before continuing west (see photograph).

In addition to these primary buildings there were several other smaller structures on the mission grounds including granaries, corn cribs, corrals, a millpond (for the gristmill), and split rail fencing built from wood milled in the mountains to the east.



Location of the Emigrant House (Gray's house) in Area F looking north toward the Oregon Trail



The Whitmans' first house located along the old oxbow of the Walla Walla River

By 1847, Whitman Mission was far more than a small outpost in the Oregon Territory. It was a growing community both physically and culturally. The Cayuse Indians, to whom the Whitmans ministered during the eleven years watched this blossoming of white culture. It is not surprising that the large influxes of pioneers and the free settlement of their land by the Whitmans generated various degrees of mistrust and misunderstanding between both groups. This tension coupled with a measle epidemic that swept through the tribe and mission residents, led to an uprising by members of a Cayuse band, and the violent deaths of the Whitmans and eleven others in 1847.

PRIMARY CONCERNS

Except for relatively narrow strips along the southern and western edge of the unit where non-native weeds and grasses are kept in some degree of control, the southern half and areas immediately adjacent to the visitor center are well-manicured lawn. Walkways through the Historic Mission section and millpond are landscaped with non-native trees and shrubs, and traverse mowed non-native bluegrass sp. lawn.

Within that section are key historic features that include the concrete block outlines of five historic structure foundations. Here grass encroachment around and between block outlines presents a problem.

Another primary feature is the reconstructed millpond (burrowing rodents, i.e. muskrats and pocket gophers present a problem to bank maintenance). The east and southern aprons of the pond are densely covered with wild rye and other grasses and sedges with weeds and grasses bordering the area near the gristmill site. Ducks and geese (that would have contributed to the Whitman diet) are now unnaturally and abundantly present.

MANAGEMENT ALTERNATIVES

Alternative 1. Restore native vegetation.

-- Because of human impact (land use) following the Whitman period, and contemporary needs associated with large numbers of park visitors, complete restoration is largely impossible, and perhaps undesirable. The current vegetation of Area F does present an appearance of a landscaped memorial, but with numerous exotic species (not all undesirable) does not adequately present the visual character of the historic period. Present control of noxious weeds along all fences, along the western walkway, and in turf areas is desirable. Replacement of non-native trees as they become hazardous should be considered in an effort to support material and visual continuity with the historic scene and revegetation efforts in adjacent areas.

-- If other similar measures were considered in the presentation of the core areas including, a vegetative cover similar to the area just north of the Oregon Trail, partial raising of building walls from the ground plain (where they are difficult to see) and moving the current entrance to the core to a more historically accurate location (regarding historic drawings and illustrations), visitor understanding of the scale and sense of the historic site could be enhanced. Impacts resulting from comprehensive restoration would be costly, time consuming, present a possible danger to in situ artifacts--and perhaps impossible to accomplish. It is possible however, that partial restoration (replacing hazardous non-native trees with native species, allowing grass to grow taller, etc.) would help to better represent the historic scene in this area. Further study might be considered appropriate in re-examining the core area and the more specific structural alternatives in this partial restoration effort.

Alternative 2. Maintain the core area as is currently being done (July 1984.

-- The mission site and visitor-use areas are in turf which not only provides a pleasant "memorial" setting, and provides in situ artifacts with protective cover until further excavations can be made. Areas within the core are mowed to insure the memorial atmosphere and to provide visibility of its historic features. Exceptions are the Oregon Trail section and fringe areas where taller vegetation "lends" itself to the historic scene. A chemical control program for noxious weeds along fence lines, in-turf, and "edge" areas has been conducted and should continue as needed (some reduction of wildlife habitat occurs, but impacts are minimal). Pocket gopher control should be continued and/or accelerated as required. The removal of weeds, and allowing certain area grasses to mature to seed, coupled with the control of gophers, may be the means for both weed and gopher control. Maturing grass areas provide wildlife cover.

-- The Whitman Ditch is mechanically cleared of giant ryegrass annually. The "wheel ruts" of the Oregon Trail and the invading grasses in the historic building outlines are maintained or controlled by chemical applications.

-- Non-native trees, other landscape vegetation, and the orchard are subject to pesticide treatment when that need for protection is indicated. Some desirable predacious insects are unavoidably killed.

CONCLUSION

CONCLUSION

The 98.15 acres of Whitman Mission National Historic Site are a complex of different land uses and functions that together comprise a single park system. Six land units are identified in this study including two pasture/grassland areas (areas B and D), an administrative area (area E), two areas of primary historic significance (areas C and F) and a sixth area, outside the current park boundaries, which provides the greater context in which Whitman Mission is situated (area A).

The emphasis in this report has been to identify the historic landscape and subsequent changes since the Whitman era (1836-1847) and provide management alternatives aimed toward enhancing the historic character and protecting the cultural resources of the park. While this report examines individual land units within the park, each area is most fully understood in the context of the park as a whole system in this sense. Selection of any management alternative for an individual land area should occur only with a clear understanding of the implications of that choice in relation to other areas.

Primary considerations in selection of alternatives should include; attention to visual continuity--the perceived sense of connection between areas including the seams between different units, material continuity in fencing, walkways, signage and vegetation, thematic clarity--the clear definition between contemporary or administrative facilities and specific historic resources; and the abilities of existing maintenance resources to achieve desired goals.

This report is the first phase of a larger study, leading to the implementation of selected alternatives. As the park considers different options it may be appropriate to coordinate with the regional divisions of Science and Technology and Resource Management regarding cost estimates and phasing programs. When alternatives are chosen it may be necessary to ammend the existing Resource Management Plan or generate new study proposals for specific aspects of revegetation. Finally, the regional divisions involved in this study will assist the park in exploring appropriate actions in developing long-range plans for the implementation of each alternative.

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Edward Starkey 31,May 1984

VEGETATION MANAGEMENT OPTIONS: WHITMAN MISSION NHS

AREA A: This area has been leased for cattle grazing for many years. Furthermore, the river channel has been modified which has no doubt changed the water table. The area has been seeded to forage species such as bluegrass and clover, and has been irrigated. Thus, because of this history of disturbance, restoration of historic plant communities would be difficult, or even impossible. Changes in the water table alone may preclude any such attempt.

However, a "pastoral setting" can be maintained using several alternative management approaches. Selection of a particular alternative will depend upon management objectives for the area.

R. Pudney and R. Zarwell of the SCS evaluated the pasture in 1978, and developed the following management programs:

Alternative 1. Seed the area to tall wheatgrass (Agropyron elongatum), fence into three pastures, and rotate grazing.

Alternative 2. Seed to tall wheatgrass and leave as a single pasture.

Alternative 3. Construct fences and develope a rotational grazing system of the existing Kentucky bluegrass pasture.

Alternative 4. Continue current management program.

From an ecological perspective, any of these four alternatives are reasonable, even Alternative 4. Although the pasture showed signs of localized erosion, it appeared to be in generally good condition. Admittedly, we visited the park during the spring when growing conditions were ideal. Nevertheless, the pasture was not in bad shape. If this alternative was selected, stocking rates and season of use could be changed to reduce localized impacts.

Cross-fencing as included in Alternative 3 would definitely increase the productivity of the pasture, and would probably decrease erosion impacts. This would be a form of "high intensity-short duration" grazing system. Livestock are placed in small pastures at high stocking rates, and moved frequently. One advantage of this approach is the consumption by livestock of both preferred and non-preferred forage plants. This decreases the competitive advantage of unpalatable plants over highly preferred species. The system is especially successful for pastures with a significant legume component. These plants fix atmospheric nitrogen and are consumed by herbivores. Most of the nitrogen is then returned to the soil via feces and urine. Thus nitrogen is cycled from the legume to the soil, and is available to other plants as well as the legume.

Both Alternatives 3 and 4 would require continued irrigation, and the conspicuous presence of cattle or sheep during the growing season. Irrigation may be distracting to park visitors, however the lessee could be required to irrigate at night and in early morinings when visitors are not present. Sprinklers are commonly moved every 12 hours and, aside from inconvenience to the lessee, I see no reason why 27 acres couldn't be irrigated adequately using such a program.

Alternatives 1 and 2 would not require long term irrigation, although it may be desirable to irrigate until tall wheatgrass is established satisfactorily. Neither of these alternatives would result in a return to vegetation typical of the Whitman period, but irrigation would be eliminated or reduced, and the stocking rates, and period of use by livestock would be greatly reduced.

The suggested alternatives range from high intensity (Alternative 3) to low intensity (Alternative 2) pasture management. The natural resource can be managed properly under any of the alternatives, but impacts on visitor experience and interpretation of the historical resource will differ.

Further work will be required to refine any Alternative selected. For example, tall wheatgrass seems like a reasonable choice for an unirrigated pasture but other species such as tall fescue may also be suitable. Additional consultation with the SCS, and county and university extension personnel would be desirable.

AREA B:

This area includes Shaft Hill and historic vegetation probably consisted of bluebunch wheatgrass and Idaho fescue, with scattered rabbitbrush and big sagebrush plants, and various forbs. Currently, cheatgrass (Bromus tectorum) is very abundant, and rabbitbrush density has increased.

Elimination of the exotic cheatgrass would be highly desirable from a park management perspective, but it is probably not possible. However, recent research at John Day Fossil Beds National Monument suggests that density of native grasses can be increased and that these grasses can be restablished in areas where they have been eliminated by exotic competition.

Most of this work has been done with bluebunch wheatgrass, so initially at least, vegetation management of Shaft Hill should focus on this species. Further research should provide additional information on re-establishment of Idaho fescue and various forbs.

I suggest that we attempt to establish good stands of bluebunch wheatgrass along the trail. Our initial efforts should probably be concentrated on the south-facing aspects of the hill. Bluebunch wheatgrass typically is dominanant on drier sites, with Idaho fescue more abundant on moister and cooler sites, such as those with northerly aspects.

Although seeds could be harvested locally from bluebunch wheatgrass plants, this process is time consuming. The Soil Conservation Service has recently released a new variety: Secar bluebunch wheatgrass which has been tested at John Day Fossil Beds NM. Seedlings were grown in "tubepaks" and then were planted directly into cheatgrass stands. These "tublings" showed a very good survival, and Secar actually had higher survival rates than local varieties. Secar was developed at Pullman, Washington and should also be suitable for the Walla Walla area.

If tublings are planted with spacings of about .3 meters, annual grasses should be suppressed and a bluebunch wheatgrass stand established fairly quickly. Planting should occur during the fall so that seedlings can take advantage of winter and early spring soil moisture. Although I am confident that this approach would be successful, it would be useful to have Drs. Marshall Haferkamp and Rick Miller of the Eastern Oregon Agricultural Experimenmt Station visit the park, and provide specific recommendations.

Obviously, the establishment of bluebunch wheatgrass stands in selected areas of Shaft Hill does not constitute a return to native vegetation. However, it is a first step. Enhancement of other native species, and reduction of the density of exotics and "increaser" native species will require a long term program which may include prescribed fire.

AREA C:

This area has been farmed and otherwise heavily disturbed for many years. Canary grass dominates the wetter sites, and exotic and noxious annual plants dominate the upland areas. Yellow star thistle is abundant.

Because of the presence of these highly competitive plants, re-establishment of native vegetation would be difficult, or impossible. However, a stable non-native grassland community can be established if suitable site preparation occurs. Mr. Larry Hooker of the Soil Conservation Service suggested, in a memo dated 9/10/81, several alternative approaches. I believe that his Alternative 1 has the best chance of succeeding. This involves disking in the fall, followed by herbicide treatment of regrowth. Fields would be disked, harrowed, packed and seeded the next spring. It may even be necessary to summer fallow the field and plant in the second fall. Seeding in the fall allows germination with any fall moisture, and an early start the next spring. There would be a certain amount of soil loss to wind erosion but this potential would have to be balanced against the increased probability of successful seeding.

This procedure could be modified to utilize the land imprinter which will be tested at John Day Fossil Beds NM during the fall of 1984. The imprinter consists of a large heavy roller with patterned lugs covering the surface. Seed is broadcast in front of the imprinter and is embedded into the soil. This procedure results in randomly distributed individual plants, rather than the precise rows produced by rangeland drills.

Although, there are a number of species which could be planted in this area, I recommend that we use a species which has demonstrated ability to compete with noxious invaders. This requirement will most likely be met by a non-native species such as pubescent wheatgrass, although streambank or thickspike wheatgrasses may be possibilities. Furthermore, a determined and aggressive approach to site preparation will be required. As demonstrated by the generally unsuccessful previous attempt to establish streambank wheatgrass, half measures will be a waste of time and money. Competition must be reduced, before seeding, to allow the desirable species to become established. It seems likely that herbicides, plowing and disking, and fire will all be required.

Following the establishment of a stable grassland, re-establishment of native species can be attempted on selected sites, if this seems desirable. For now, the elimination of noxious weeds is the most important objective. As for Areas A and B, the action plan should be developed in consultation with SCS, county extension, and university personnel.

A PROFILE OF THE ORIGINAL PLANT COMMUNITIES AT WHITMAN MISSION NHS: A DRAFT REPORT

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INTRODUCTION

Whitman Mission is located on the southern extreme of the Palouse Prairie region. Originally, this prairie was dominated by perennial grasses, principally bluebunch wheatgrass (Agropyron spicatum) which fourished in vast swords over the rolling plains. Intermixed with it were smaller patches of sandberg bluegrass (Poa secunda) and Idaho fescue (Festuca idahoensis). The region is classified as the Agropyron-Poa habitat type (Daubenmire 1942). Large native herbivores were generally absent from the Palouse, and because of this, the native grasses evolved with a low resistance to grazing. Subsequent grazing by domestic livestock and extensive cultivation for wheat are the main reasons why native perennial grasslands are now rare on the Palouse.

The original inhabitants of the area around Whitman Mission were the Cayuse indians. The Cayuse had no domestic livestock and practiced very little crop agriculture, depending instead on a partially nomadic existence which emphasized food gathering and salmon fisheries (Harris 1967). Fire was perhaps the most destructive tool of the Cayuse. It would be used periodically to burn particular areas to increase the production of wild forage and accessibility of plant foods; to facilitate hunting and travel by burning away underbrush; and to encircle game (Shinn

1980). The regularity with which the areas on or near the historic site were burned historically cannot be determined, but frequent cultural burning of any particular area was probably rare (Shinn 1980).

PLANT COMMUNITIES ON THE SITE

At the time the mission was established in 1836, an ox-bow of the Walla-Walla River, which has since moved to the south, flowed through the site (at least during times of high water). It is probable that at the time the mission was established, a mixture of three plant communities occupied the site (Fig 1). On the floodplains along the Walla-Walla and nearby Mill Creek, a narrow plant community consisting of dense tangled thickets of willows, cottonwoods, wild dogwoods, blackberries, elderberries, and other species common to riparian areas probably occurred. An association of perennial grasses, shrubs, and native forbs probably occupied the hillside area where soil depths and drainage were greater. Perennial grasses common to the Palouse probably dominated the rest of the site.

Intermixed throughout the site was giant wild ryegrass (Elymus condensatus), a species preferring a year-round supply of soil moisture and occurring primarily on clay bottomlands and seepage areas. It now occurs as scattered large bunches of grass, but historically, it may have been more extensive. It was this species that gave the indian name to the location, Waiilatpu, meaning place of the people of the ryegrass.

Although the indians probably occupied the site at least periodically for centuries before the mission was established, they probably didn't have a profound effect on the landscape. However, soon after the mission was established, an irrigation system was developed, crops planted, and areas were opened to grazing by draft stock and cattle. As it was located on the Oregon Trail, considerable stock moved through the mission, and there was ample opportunity for the introduction of exotic plants. The changes that occurred to the plants and landscape during the time the mission was active -- the introduction of domestic livestock, exotic plants, and agriculture, and the removal of riparian vegetation for fire and building wood, were a portent of things to come for the entire Palouse Prairie.

RECENT ACTIVITES

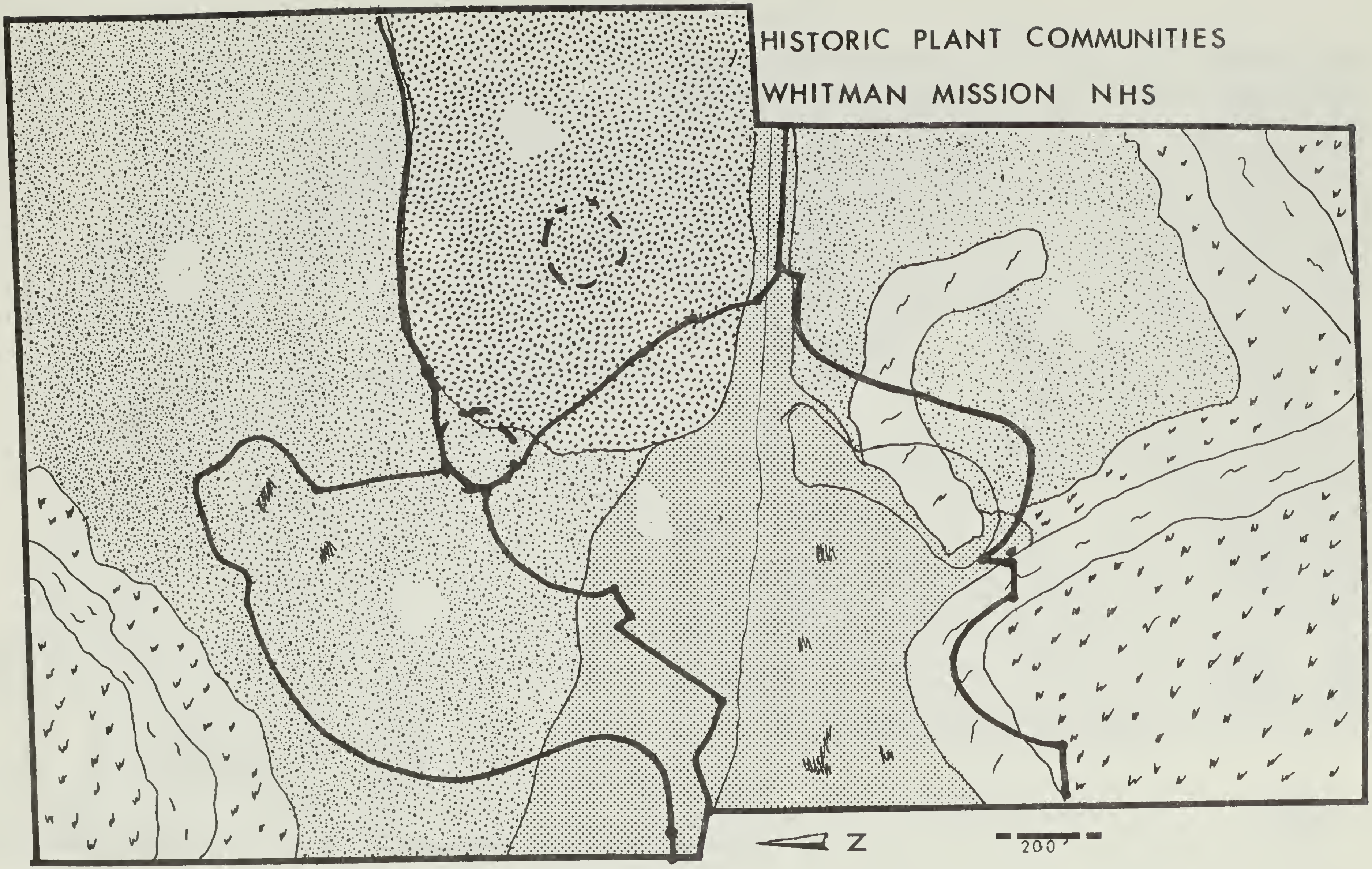
Activities on the site between the historical period and the time of NPS acquisition in 1936 have not been well documented. Such information could provide a better understanding of how present day vegetation patterns have emerged. For example, one of the most disturbed areas on the site (north of the maintenance area) apparently was frequently tilled and used for vegetable crops.

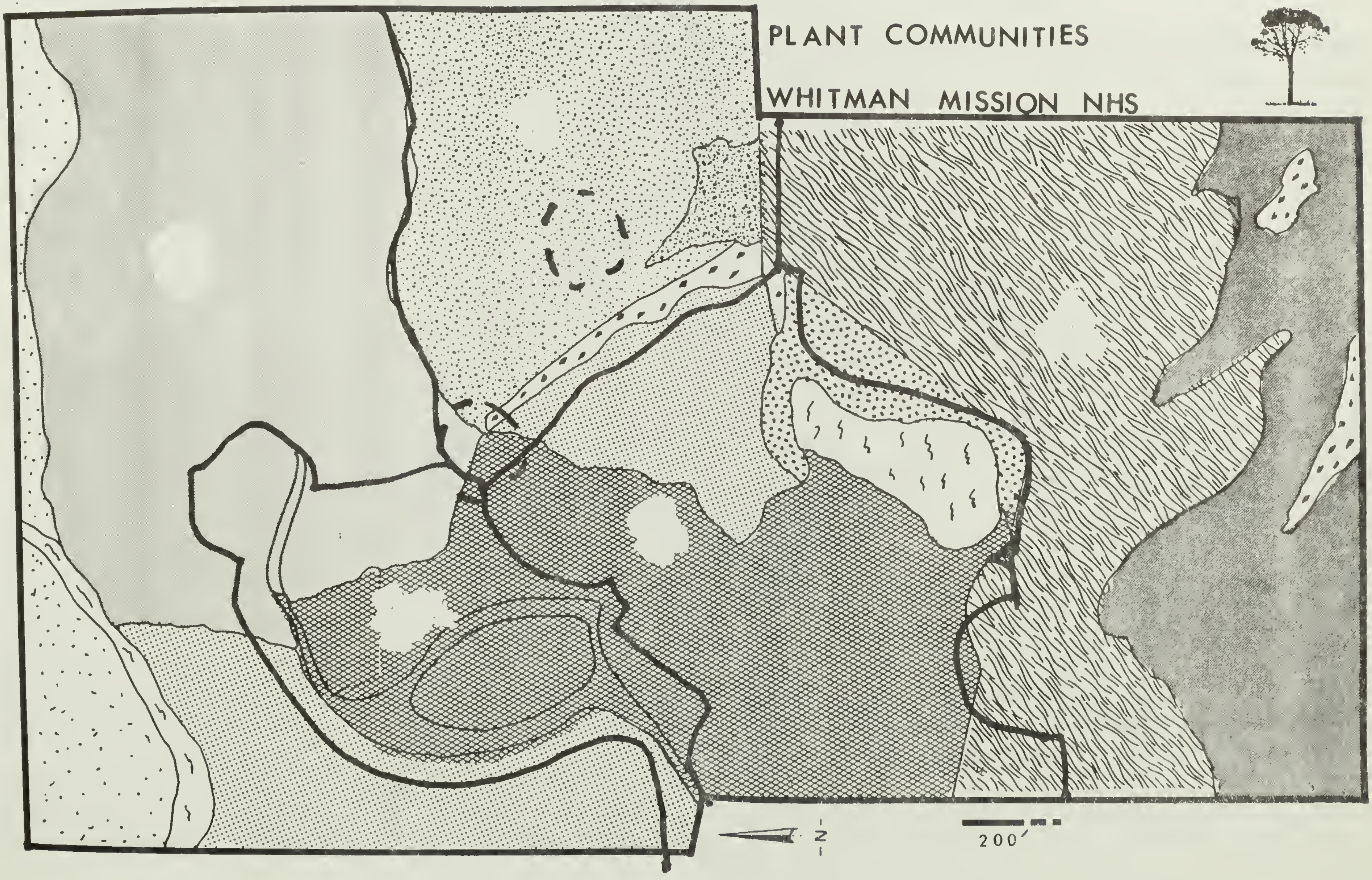
I have thus far been able to find only a few historic photos of the landscape which are clear enough to interprete vegetative conditions, and which are dated. Many of these are taken of or from the memorial shaft hillside. They shown that the composition of the plant community on the top of the hill has changed drastically since the 1920's. In one photo (J-2-1), the mound is covered entirely by short grasses. Shrubs are rare and are found only along the roadside. A 1936 photo (E-7-2) shows taller bunch grasses invading the site. The top of the hill was at one point part of a cultivated field as witnessed in a photo (E-7-9) taken about 1950. Chrysothamnus appears to have begun invading the top of the hill about 1957. The site was disturbed in 1961 when the memorial shaft was remodeled. A 1967 photo shows Chrysothamnus dominating the site.

Pictures of the pasture taken from the top of the hill show it being grazed by cattle and horses at least since 1936 (photo J-1-12). The northern half of the field was planted in corn this same year. A 1950 photo (E-7-9) shows the relative level between the pasture and the field to the east, and can be used to see the difference in compaction that has occurred throughout the years.

In summary, the undeveloped areas of the historic site reflect a 130 year history of a diversity of land uses and landscape disturbances. The development of the present plant communities (Fig 2) which are dominated by weedy species, annual grasses, and forbs is not surprizing, but is found repeated time and again over broad areas of southeastern Washington (Daubenmire 1975). The individual variation that is present on specific areas of the historic site relates to the intensity and time since the last disturbance as well as to differences in soils and water availability.

HISTORIC PLANT COMMUNITIES
WHITMAN MISSION NHS





PLANT COMMUNITIES

WHITMAN MISSION NHS

KEYS

Historic Communities

▒ Native grassland: bluebunch wheatgrass - Agropyron Spicatum
sandberg bluegrass - Poa secunda

▒ Developed area with cultivated crops

⁙ Shrub grassland blue bunch wheatgrass, Chrysothamnus sp. - rabbitbrush, various forbs

w w riparian woodland Cottonwood, + dense shrubs mixed with giant wild-rye grass - Elymus condensatus

Present communities

▒ Shrub grassland : rabbit brush, sage brush - Artemisia sp.
cheatgrass - Bromus tectorum, forbs

/// Pasture - Clover - Trifolium sp. , Poa sp. - bluegrass

▇ Pasture - foxtail barley - Hordeum jubatum, clover

m m Mixed deciduous woodland

Lawns - Bluegrass sp.

▒ Mixed grasses - Primarily

▒ Grassland - primarily bluebunch wheatgrass

▒ Mixed weed-grassland - Agropyron riparium (seeded) - stream bank wheatgrass, cheatgrass, thistle, wild mustards,

⁙ Mixed weed - shrub - poison hemlock - Conium maculatum

⁙ Mixed grass + sedge - giant wildrye

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